

# Jefferson Proving Ground Madison, Indiana



## **Final**

Record of Decision for  
Sites 1, 2/27, 3/4, 7/21B, 9/10, 12A, 12B, 12C, 14, and  
21A/30, and No Further Action Sites 8, 11, 13,  
15 to 19, 20A, 20B, 22 to 26, 28, 29, and 31 to 50

November 2004

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## List of Acronyms

AOC	area of concern
ARAR	Applicable or Relevant and Appropriate Requirement
AREE	areas requiring environmental evaluation
BCT	BRAC Cleanup Team
BIRA	Baseline Risk Assessment
BRAC	Base Realignment and Closure
DERA	Detailed Ecological Risk Assessment
CERCLA	Comprehensive Environmental Response Compensation and Liability Act
CERFA	Community Environmental Response Facilitation Act
COC	Contaminants of Concern
COPC	Chemicals of Potential Concern
DDE	2,2-Bs(p-chlorophenyl)-1,1-dichloroethene
DU	depleted uranium
EIS	Environmental Impact Statement
EPIC	Environmental Photographic Interpretation Center
ESD	Explanation of Significant Difference
FS	Feasibility Study
HQ	hazard quotients
IAP	Installation Action Plan
IDEM	Indiana Department of Environmental Management
JPG	Jefferson Proving Ground
LUC	Land Use Control
MCL	Maximum Contaminant Level
MOA	Memorandum of Agreement
NCP	National Contingency Plan
NCR	National Capitol Region
NEIC	National Enforcement Investigations Center
NPDES	National Pollutant Discharge Elimination System
NPL	National Priority List
NRC	Nuclear Regulatory Commission
PA	Preliminary Assessment
PAH	polycyclic aromatic hydrocarbon
PCB	Polychlorinated Biphenyl
pci/L	picocuries per liter
PCP	pentachlorophenol
PERA	Preliminary Ecological Risk Assessment
PP	Proposed Plan
PR	preliminary review

PRG	Preliminary Remediation Goal
RA	Remedial Action
RAB	Restoration Advisory Board
RAO	Remedial Action Objective
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
RD/RA	Remedial Design/Remedial Action
RFA	RCRA Facility Assessment
RG	Remediation Goal
RI	Remedial Investigation
ROD	Record of Decision
SAIC	Science Applications International Corporation
SARA	Superfund Amendments and Reauthorization Act
SSAs	Sewage Sludge Application Areas
STP	Sewage Treatment Plant
SVOCs	Semi-Volatile Organic Compounds
SWMU	Solid Waste Management Units
TBC	To Be Considered
TBE	To be evaluated after the public review period
TCA	1,1,1-trichloroethane
TCE	trichloroethylene
TETC	The Earth Technology Corp.
USACE	U.S. Army Corps of Engineers
USAEC	U.S. Army Environmental Center
USAEHA	U.S. Army Environmental Hygiene Agency
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
UST	Underground Storage Tank
UXO	Unexploded Ordnance
VOC	Volatile Organic Compound

# **I. DECLARATION FOR THE RECORD OF DECISION**

## **SITE NAME AND LOCATION**

Jefferson Proving Ground  
Madison, Indiana

## **STATEMENT OF BASIS AND PURPOSE**

This decision document presents proposed remedies for environmental restoration of certain sites requiring remedial actions at Jefferson Proving Ground (JPG), in Madison, Indiana. These remedies are chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986, the National Contingency Plan (NCP) and related laws and policies governing the cleanup of sites potentially impaired by hazardous substances. This decision is based on the administrative record file for this site. The U.S. Army, the Indiana Department of Environmental Management (IDEM), and the United States Environmental Protection Agency (USEPA) have reached agreement on the proposed remedies.

## **ASSESSMENT OF THE SITE**

The response action selected in this Record of Decision (ROD) is necessary to protect the public health or welfare, or the environment from actual or threatened release of hazardous substances into the environment.

## **DESCRIPTION OF THE SELECTED REMEDIES**

Of the 50 sites at JPG (combined from 54 locations), 15 sites were evaluated for remediation alternatives. These include Sites 1, 2, 3, 4, 7, 9, 10, 12A, 12B, 12C, 14, 21A, 21B, 27, and 30. This ROD also includes sites recommended for No Further Action (NFA). In total 37 sites are included for NFA, these are Sites 8, 11, 13, 15 to 19, 20A, 20B, 22 to 26, 28, 29, and 31 to 50 (see Table 2-1). These NFA sites are discussed in Sections 2 and 5 of this ROD. In addition, two sites (Sites 5 and 6) are not included in this ROD because a Decision Document was prepared and approved in 2001 (Montgomery Watson, August 2001) for these two sites.

Of the 15 sites evaluated for remediation, some sites are combined due to proximity or for having like contaminants. The recommended remedial actions for the 15 sites are:

<b><u>Site</u></b>	<b><u>Recommended RA</u></b>
Site 1 Soil	Institutional Controls, to restrict residential use
Sites 2/27 Soil	Institutional Controls, to restrict residential use
Sites 3/4 Groundwater	Limited Action (Institutional Controls and Monitoring)
Sites 3/4 Soil	Excavation and Off-Site Disposal
Sites 7/21B Groundwater	Limited Action (Institutional Controls with Monitoring)
Sites 9/10 Soils	Site is Restricted Use by existing MOA. Site will not be transferred
Site 12A Groundwater	Limited Action (Institutional Controls and Monitoring)
Site 12B Groundwater	Limited Action (Institutional Controls and Monitoring)
Site 12C Groundwater	Limited Action (Institutional Controls and Monitoring)
Site 14 Groundwater	Limited Action (Institutional Controls and Monitoring)
Site 14 Soil	Excavation and Off-site Disposal - to Complete Soil Removal Action
Sites 21A/30 Soil	Excavation and Off-Site Disposal

Briefly speaking, Limited Action (Institutional Controls and Monitoring) was the selected remedy for groundwater contaminants, while Excavation and Off-Site Disposal was selected for soil contaminants requiring remedial action. Following is the description of these two remedies:

**Limited Action (Institutional Controls and Monitoring):** This does not involve active groundwater remediation; site groundwater would be left in place. However, this alternative would limit the potential for human and fauna exposure to site contaminants. Deed and/or land use restrictions would be developed to prevent future usage of the contaminated groundwater. Groundwater monitoring would include periodic groundwater sampling to evaluate groundwater chemistry and natural dilution and dispersion. Development of specific land use restrictions and groundwater monitoring frequency will be determined during the remedial design (RD) phase with participation by the BRAC Cleanup Team (BCT).

**Excavation and Off-Site Disposal of Soils:** This involves removal of contaminated soil that exceeds USEPA Region 9 Residential Preliminary Remediation Goals (PRGs). The USEPA Region 9 PRGs were selected as cleanup goals in agreement from all involved parties, i.e., USEPA, IDEM, the Army, and the RAB. Confirmation samples would then be collected to verify that residual contamination in soils is below these residential PRGs. Imported soil would be used to backfill this excavation. The excavated soils would be transported for disposal to a licensed landfill following characterization testing. Confirmation sampling will be determined during the RD phase with BCT participation.

In addition, Sites 1, and 2/27 will have land use controls (LUC), i.e., deed restrictions governing land use. A LUC Soils Remedial Design/Remedial Action (RD/RA) Work Plan will be prepared for Sites 1, and 2/27. Sites 9/10 will have restricted use as governed by the Memorandum of Agreement (MOA), dated May 2000 between the Army, Air Force, and U.S. Fish and Wildlife Service (USFWS).

### **STATUTORY DETERMINATIONS**

The proposed remedies are protective of human health and the environment, comply with Federal and State requirements that are applicable or relevant and appropriate to the remedial actions, are cost-effective, and utilize permanent solutions to the maximum extent practicable.

The proposed remedies for soil and groundwater contamination at JPG do not directly satisfy the statutory preference for treatment as a principal element of the remedy for the following reasons:

- These contaminated soils are expected to be classified as non-hazardous waste and as such, the Land Disposal Restrictions are not applicable. Therefore, treatment is not required prior to disposal.
- Limited Action (institutional control and monitoring) is the proposed remedy for this contaminated groundwater. Natural attenuation is expected to occur as a result of this remedial action to reduce long-term concentration of organic compounds in groundwater.

Because the proposed groundwater remedy – Limited Action (Institutional Control & Monitoring) will result in contaminants remaining in groundwater above levels that allow for unlimited use and unrestricted exposure, a statutory review will be conducted within 5 years after initiation of remedial action to ensure that the remedy is, and will continue to be, protective of human health and the environment.

In addition, a 5-Year Review will also be performed for the sites requiring institutional controls for soils, i.e., deed restrictions for Sites 1, and 2/27 as long as contamination exists that prevents unrestricted access

or reuse of the sites. Sites 9/10 are governed by the May 2000 MOA, signed by the Army, Air Force, and USFWS.

**AUTHORIZING SIGNATURES**

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Colonel Robert R. Derrick  
Chief, U.S. Army Base Realignment and Closure Division

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Date

**Reviewed and Concurred by:**

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Ms. Karen Mason-Smith  
Remedial Project Manager  
United States Environmental Protection Agency

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Date

## **II. DECISION SUMMARY**

### **1 SITE NAME, LOCATION, AND DESCRIPTION**

Jefferson Proving Ground (JPG) occupies approximately 55,265 acres of land along U.S. Highway 421 north of Madison, Indiana, as illustrated in Figure 1. The facility is located in portions of Ripley, Jennings, and Jefferson Counties. The installation is approximately 18 miles long (north to south) and varies from 3 to 6 miles wide (east to west). There are 481 buildings located throughout JPG. A major portion of JPG is wooded and the remainder is open grassland or recently cultivated farmland. Industrial buildings, workshops, administrative buildings, and personnel housing are located in the southern portion of the facility. A line of 268 gun positions ran east to west across the southern portion. Weapons were fired at targets located to the north of these gun positions. The immediate area of the gun positions is referred to as the Firing Line. In addition to the gun positions, the facility consisted of 13 permanent test complexes, 7 ammunition assembly plants, and 50 sites (combined from 54 locations).

JPG was used as a proving ground from 1941 through 1995. A wide assortment of conventional munitions and weapons were tested at the facility. These include propellants, projectiles, cartridges, mortars, grenades, fuses, primers, boosters, rockets, tank ammunition, mines, and weapon components. The mission of JPG was primarily to plan and conduct production acceptance tests, reconditioning tests, surveillance tests, and other studies of ammunition and weapons systems.

Past activities at JPG have included detonation, burning, and disposal of many types of waste propellants, explosives, and pyrotechnic substances at the facility. Many of these activities resulted in residual risks to public health and the environment. Safety concerns involving possible unexploded ordnance (UXO) also remain. Potentially hazardous substances identified at JPG include various explosive compounds, waste propellants, lead, chlorinated solvents, wood preservatives, sulfur, silver, photographic development wastes, sanitary wastes, and petroleum products. Landfill items also included construction debris, metal, concrete, wood, red lead paint, trichloroethylene (TCE), and methylene chloride-contaminated polyurethane (Pelron A&B). In the past, JPG generated other hazardous wastes which included used paint thinners (i.e., mineral spirits, xylene, and Stripeze<sup>®</sup>), paint sludge, Stoddard solvent, pentachlorophenol (PCP)-treated wood boxes, and 1,1,1-trichloroethane (TCA). Some of these substances are known to have been released to the soil as a result of waste disposal activities. Subsequently, groundwater was also contaminated through contaminant migration.

North of the Firing Line at JPG are numerous impact areas that are comprised of high explosive impact targets, asphalt- and sediment-bottom ponds for testing proximity fuses, a gunnery range, mine fields, and a depleted uranium (DU) impact area. Surrounding the impact areas are safety fans where wide, long, or short rounds could fall. These areas are considered to contain unexploded ordnance.

Prior to facility closure in 1995, impact areas were routinely kept clear of vegetation by disc plowing and infrequent herbicide application. None of the impact areas, including the DU impact area, are included in this ROD. Investigation of the DU impact area was previously conducted in accordance with the Nuclear Regulatory Commission (NRC) required permit to address the potential radiological hazards associated with DU use at JPG. Groundwater was routinely sampled at the site, and the data were transmitted to NRC. The results from this routine sampling and analysis indicate that DU contamination in the groundwater at the area was not detected.

[END OF SECTION]

## **2 SITE HISTORY AND ENFORCEMENT ACTIVITIES**

The Defense Secretary's Commission on Base Realignment and Closure (BRAC) recommended JPG among other bases for closure and/or realignment in December 1988. The Congress mandated JPG be closed and its mission be realigned with Yuma Proving Ground in April 1989. As a result, the United States Army Corps of Engineers (USACE) was given the responsibility for managing and conducting environmental investigations at JPG in association with the BRAC Program. Final closure of JPG occurred on September 30, 1995. Since that time a caretaker has assumed day-to-day maintenance and compliance duties for those portions of JPG that have not been turned over to another organization for reuse. The U.S. Army at JPG ceased munitions testing by September 30, 1994.

Since final closure of the facility in the fall of 1995, approximately 2,000 acres have been transferred to a local business owner and approximately 220 acres have been deeded to Jefferson County. Ownership of the entire area south of the Firing Line will eventually be transferred following completion of remedial action activities required to clear the areas of contamination exceeding cleanup goals. Interim removal actions have been conducted by the USACE, Louisville District, for various sites previously identified as posing a risk to human health and the environment. On the basis of the results of the Phase II Remedial Investigation (RI), additional cleanup actions are required before the property south of the Firing Line can be transferred.

The 51,000-acre area north of the Firing Line will remain under Army ownership with the Indiana Air Guard utilizing the approximate 1,000-acre range under license for training exercises. The U.S. Fish and Wildlife Service (USFWS) manages approximately 50,000 acres as the Big Oaks National Wildlife Refuge through a memorandum of agreement. The agreement provides an opportunity for the USFWS to conduct an enhanced level of ecosystem management and study, and to address long-term natural resource management at JPG. The USFWS will evaluate the status of fish, wildlife, and habitats over the 51,000-acre area (which includes Sites 9/10) north of the Firing Line. Public use of the area will continue to be limited due to the potential for coming in contact with UXO.

In 1988, the U.S. Army Environmental Hygiene Agency (USAEHA) completed the *Interim Final Report of Ground Water Contamination and Evaluation of Solid Waste Management Units (SWMUs) at JPG*. This evaluation included visual site inspections of several SWMUs and recommendations for sampling to characterize potential chemical contamination at the base. In addition, information was included regarding the following (USAEHA 1988):

- Presence of polychlorinated biphenyls (PCBs),
- Pesticide use at JPG,
- Wastewater treatment at JPG, and
- Analysis of groundwater.

In January 1989, Environmental Science and Engineering, Inc. completed a Remedial Investigation/Feasibility Study (RI/FS) that defined the nature and extent of groundwater contamination around the Gate 19 Landfill (Sites 9/10) and suspected contamination in the vicinities of the solvent disposal areas at Buildings 279 (Site 12A), 602 (Site 12B), and 617 (Site 12C). Additionally, the hydrogeologic setting of the investigated areas was evaluated to estimate the rate and direction of groundwater flow and consequent contaminant migration.

In September 1989, a working document of the Installation Assessment Relook Program was completed. This document is a supplement to the USEPA's original Environmental Photographic Interpretation Center (EPIC) photographs. Eighteen sites were re-photographed and analyzed. The original EPIC study provided a summary of possible past disposal areas at JPG identifiable through evaluation of historical aerial imagery. A reassessment of possible CERCLA sites was conducted under this program.

In August 1989, the U.S. Environmental Protection Agency (USEPA) National Enforcement Investigations Center (NEIC) conducted a comprehensive multimedia assessment of JPG. This NEIC report published in April 1990 was requested by the Environmental Review Branch, Planning and Management Division, USEPA Region 5 in support of the USEPA Region 5 environmental review of military installations proposed for closure. The purpose of the report was to determine the compliance status of JPG operations with applicable environmental laws, regulations, permits, consent decrees, and other related requirements and conditions. This investigation was accomplished through review and evaluation of data from USEPA Region 5 and JPG files, and implementation of an on-site inspection (USEPA 1990).

In October 1989, Ebasco Environmental began an Enhanced Preliminary Assessment (PA) through Argonne National Laboratory to support the BRAC Program. The purpose of the Enhanced PA was to assess environmental quality of JPG. Ebasco prepared the *Master Environmental Plan* for JPG in November 1990, as a follow-on to the *Enhanced PA Report*. The *Master Environmental Plan* detailed the existing conditions at the 36 SWMUs from the Enhanced PA, 10 areas requiring environmental evaluation (AREEs), additional general environmental concerns at JPG, additional data requirements, and proposed activities to provide the required data (Ebasco 1990b).

In 1991, the USACE prepared an Environmental Impact Statement (EIS) to identify and address the environmental impacts of the closure of JPG and relocation of its mission of ammunition acceptance testing to Yuma Proving Ground, Yuma, Arizona. Considered in this report were the consequences of closure, relocation, and future use of JPG (USACE 1991).

In February 1992, A.T. Kearney, Inc., completed the *RCRA Facility Assessment* (RFA) for JPG. This report included the results of the visual site inspection and the preliminary review (PR) of available relevant documents. The RFA identified 86 SWMUs and areas of concern (AOCs) and included functional and physical descriptions of 67 of the 86 SWMUs and AOCs, their dates (or suspected dates) of operation, waste management practices, and release controls.

In June 1992, Mason & Hanger, Battelle, and ARS completed the Cleanup and Reuse Options Study. The purpose of this study, which encompassed the entire installation, was to document environmental responses and corrective actions within a range of potential reuse options.

In April 1993, Vail Research and Technology summarized results of a radon-monitoring investigation conducted at JPG in the *Radon Monitoring Results for the Army Radon Reduction Program, JPG*. This report documents a radon-monitoring program in which 25 structures at JPG were monitored for radon in early 1993. The resulting radon concentrations measured levels ranging from 0.5 picocuries per liter (pCi/L) to 1.9 pCi/L, which were below the USEPA action level of 4 pCi/L (Vail R&T 1993).

The *Installation Action Plan* (IAP) was completed in March 1993 by the USACE. This report summarizes the 103 previously identified sites at JPG. The 1993 status and contaminants of concern (COCs) are listed for the sites in relation to further environmental work (if any) to be accomplished. The remaining sites are either UXO sites or sites north of the firing line in areas for which the Army Secretariat determined that no cleanup would occur due to high concentration of UXO.

*The Community Environmental Response Facilitation Act (CERFA) Report*, completed by The Earth Technology Corporation (TETC) in December 1993, identified real property where no known CERCLA-regulated hazardous substances or petroleum products were stored, released, or disposed at BRAC properties, specifically at JPG. The identified real property would offer the greatest opportunity for immediate reuse and redevelopment (TETC 1993).

In September 1992, Rust E&I completed RI/FS Work Plans and an Addendum in June 1993 that described the procedures to conduct the initial RI/FS investigation of 50 sites (54 locations) located at JPG. The RI objectives were to define the extent and magnitude of environmental contamination and assess human health and environmental risk associated with contamination at these sites. The 1992 Work Plans outlined the overall approach and defined the activities required to provide a comprehensive study of 25 previously identified sites (22 SWMUs and 3 other sites) at JPG. In June 1993, these work plans were modified by addenda to incorporate an additional 29 sites. The Work Plans were prepared in accordance with CERCLA and included the investigative approach as stated by the USACE. These plans were submitted to the IDEM, USEPA Region 5, and USACE for review and approval.

Phase I RI field sampling, as prescribed in the Work Plans, was completed in July 1993. Data analysis was completed in January 1994. *The Final Draft Remedial Investigation Report for Sites South of the Firing Line, Jefferson Proving Ground, Indiana* was completed in July 1994. The report included baseline human health and ecological risk assessments and conclusions and recommendations. This document was submitted for Army, USEPA, and IDEM review and comment. Following receipt of review comments, it was determined that data gaps existed for several sites evaluated during the Phase I RI. As a result of the Phase I RI, 24 sites were identified as requiring no further action (NFA). A Technical Memorandum for No Further Action was prepared for each of these sites.

To address the data gaps of the Phase I RI, Rust E&I prepared and submitted *Phase II RI Work Plans* that provided requirements and procedures for field investigation activities and laboratory analyses to fill the identified data gaps. Phase II Field investigation activities were conducted from October 1995 to June 1996. By May 1997, the USACE had completed interim removal actions at five sites and closure reports were prepared and submitted for regulatory approval. In addition to the Phase II field activities performed in 1995 and 1996, Work Plans were prepared for additional ecological surveys that were conducted in September 1997 to fill data gaps identified from the *Preliminary Ecological Risk Assessment* (PERA) presented in the *Final Draft RI Report*. The 1997 ecological field investigation activities provided data needed to complete the *Detailed Ecological Risk Assessment* (DERA) presented in this report. In addition, field investigation activities at a new burning/disposal site identified during a UXO geophysical survey in the area of the abandoned landfill (Sites 3/4) were also completed in September 1997.

Late in 1999 (and after JPG closed in September 1995), the USEPA Region 5 decided to consolidate the RCRA compliance issues/sites at JPG with the CERCLA office, in order to have a single point of contact for the Army and the state.

The *Draft Phase II Remedial Investigation Report, South of the Firing Line, Jefferson Proving Ground, Indiana* was submitted for regulatory review in August 1998. After that time, an interim removal action was performed at 5 sites and additional monitoring wells were constructed and sampled. A Draft Final RI was completed by MWH to address agency comments on the Draft document and to incorporate the new work performed since the submittal of the Draft RI. The Draft Final RI was submitted in March 2002, and the Final RI was submitted in September 2002.

Since the start of Phase II RI activities in 1995, interim removal actions had been conducted at several sites. Closure reports had been prepared for those sites and submitted to the USEPA and IDEM for review and approval.

The Final Phase II RI results in the recommendation that an additional 15 sites be recommended for NFA because they did not appear to pose a risk to human health and the environment exceeding USEPA risk-based criteria, or because they were being addressed under another program (i.e., on-going asbestos abatement and UST removal programs being conducted by USACE). Table 2-1 lists all the sites recommended for NFA based on the results of the Phase I and Phase II RI. If a site was to be evaluated under another program, that information is also listed in Table 2-1. In summary, the number of sites evaluated, and the sequence of NFA identified includes:

<u>Item</u>	<u>Number of Sites</u>
• Number of impacted areas initially evaluated	54
• Number of sites identified as NFA based on Phase I RI (Table 2-1)	24
• Number of sites identified as NFA based on Phase II RI (Table 2-1)	15
• Number of remaining sites carried forward to FS	15

The remaining 15 sites had contamination that resulted in risks to human health and/or the environment that exceeded regulatory risk-based criteria. The *Final Feasibility Study, Jefferson Proving Ground, Madison Indiana, August 2003* was prepared to address the risks identified for these remaining sites and to evaluate remedial action alternatives. For each of the 15 sites in the FS, remedial action objectives (RAOs) have been established, alternatives have been identified and screened, a detailed analysis comparing the alternatives against CERCLA evaluation criteria has been performed, and recommended alternatives are presented.

The *Final Proposed Plan, Sites 1, 2/27, 3/4, 7/21B, 9/10, 12A, 12B, 12C, 14, and 21A/30* (MWH, February 2004) was prepared as part of the CERCLA process to summarize the FS in a clear concise manner for presentation to the general public.

[END OF SECTION]

### **3 HIGHLIGHTS OF COMMUNITY PARTICIPATION**

The U.S. Army, the IDEM, and the USEPA have reached agreement on the proposed remedies for the environmental restoration of those sites requiring action at JPG, in Madison, Indiana. The Army invited public comments on the Proposed Plan from February 20 to March 31, 2004, and held a public presentation on March 23, 2004. The public had 30 days for comments and all comments received an individual written response, and are included in the Responsiveness Summary section of this ROD.

Community involvement prior to the issuance of the Proposed Plan included regularly scheduled meetings with the JPG Restoration Advisory Board (RAB), which is comprised of interested members of the surrounding communities. All the documents associated with JPG are part of the administrative record located at Duggan Library at Hanover College in Hanover, Indiana.

[END OF SECTION]

## **4 SCOPE AND ROLE OF OPERABLE UNITS OR RESPONSE ACTIONS**

Past releases and disposal practices at JPG have resulted in soil and groundwater contamination with metals, volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), dioxins, pesticides, and PCBs. The goal of the overall cleanup activities at JPG is to eliminate or reduce the levels of contaminants to concentrations that are protective of human health and the environment, such that no adverse health effects or adverse ecological impacts will result from current or future uses of the JPG property.

As previously stated, the RI was performed originally for 50 sites (54 locations) at JPG. As a result of the RI, only 15 sites were evaluated for Remedial Actions. Sites were recommended for NFA because they did not pose a risk to human health or the environment or because they were being addressed under another program (Table 2-1). Refer to Sections 2 and 5 for a more detailed summary of the NFA sites.

Of the 15 sites evaluated for remedial action, five sites require LUC to prevent residential use. These sites are Site 1, 2/27, and 9/10. Sites 9/10 are currently restricted from residential use per the May 2000 MOA. The other ten sites (3/4, 7/21B, 12A, 12B, 12C, 14, 21A/30) were found to require remedial action for soil and/or groundwater contaminants. Refer to Section 5 for more detailed discussion of the 15 sites.

This ROD presents the proposed response actions for soil and groundwater contamination at JPG. The purpose of these response actions is to protect human health and the environment by cleaning up and preventing exposure to contaminants in soil and groundwater and to eliminate the potential for contaminated soils to be a continuing source of groundwater contamination.

The Army presented recommended final remedial alternatives to the public in a Proposed Plan. The public was provided an opportunity to comment on the preferred alternative(s) prior to remedy selection. This final ROD was prepared in accordance with the NCP.

[END OF SECTION]

## **5 SITE CHARACTERISTICS**

This section provides an overview of the site characterization of JPG based on the RI and FS performed at the site. The RI included sampling and analysis to characterize the nature and extent of site contamination and background conditions, and the Baseline Risk Assessment (BIRA) of current and potential future risks to human health and the environment posed by the contamination for the exposure pathways associated with future land use. The contaminants of concern at each site are above background levels unless otherwise stated. Detailed description of the investigation work performed at JPG and the BIRA are presented in the *Final Phase II Remedial Investigation, Jefferson Proving Ground, Madison Indiana, September 2002* (Final RI). Fifty sites (at 54 locations) were investigated during the Phase I and Phase II RI. The Phase I and Phase II RI recommended 39 sites for NFA because they did not pose an unacceptable risk to human health and the environment exceeding USEPA risk-based criteria, or because they were being addressed under another program (i.e., asbestos abatement and UST removal programs). Only 15 sites were evaluated in the FS for remediation alternative evaluation based on levels of contamination that exceeded regulatory risk-based criteria for the residential exposure scenario. Those sites include:

- Site 1 – Building 185 Incinerator
- Sites 2/27 – Sewage Treatment Plant Area
- Sites 3 – Explosive Burning Area, and 4 – Abandoned Landfill and The New Burn Site
- Sites 7/21B – Red Lead Disposal Area and Temporary Storage Area
- Sites 9/10 – Gate 19 Landfill and Burning Ground South of Gate 19 Landfill
- Site 12A – Building 602 Solvent Pit
- Site 12B – Building 617 Solvent Pit
- Site 12C – Building 279 Solvent Pit
- Site 14 – Yellow Sulfur Disposal Area
- Sites 21A and 30 – Building 204 Temporary Storage Area.

Detailed information of the 15 sites evaluated in the FS is provided in the *Final Feasibility Study, Jefferson Proving Ground, Madison Indiana, August 2003*. A brief summary of these and the NFA sites follows:

### **5.1 Site 1 - Building 185 Incinerator**

The Building 185 incinerator is located just west of the Sewage Treatment Plant in the extreme southwestern part of the installation near the intersection of Engineers Road and Tokyo Road (Figure 2). The incinerator is located in an 800-square-ft building and was primarily used to burn debris, small ammunition, and paper products from the installation.

Based on the results of surface soil sampling, presented in the Final RI, all metals except aluminum, arsenic, beryllium, chromium, and manganese at this site are at levels below USEPA Region 9 risk-based criteria. The arsenic concentration at this site is within the range of those found in background samples and therefore it has been determined to be a result of naturally occurring variations in soil types rather than a result of releases from the incinerator. The results of the sampling for dioxins/furans indicate that several dioxins/furans are present in the surface soils but are at concentrations similar to those found in background samples. Regardless, the metals and dioxins were carried into the risk assessment as contaminants of potential concern (COPCs).

## **5.2 Sites 2/27 - Sewage Treatment Plant Area**

This area includes the Sewage Treatment Plant (STP) for JPG, the water quality laboratory associated with the Sewage Treatment Plant, and four former sewage sludge application areas (SSAs). This area (approximately 2.5 acres total) is located in the southwestern corner of JPG (Figure 2). Historically, influent to the plant has included domestic and commercial wastewater, a small quantity of unspecified industrial wastewater, boiler blowdown water, rinses from an on-site photographic lab, and water from the Building 186 oil/water separator. Sludge was previously stockpiled near the treatment plant and was reportedly spread on fields within the installation as a means of disposal. Currently, the majority of the wastewater is domestic sewage from privately leased buildings that are predominately residential, light industrial, and storage. Treated wastewater is discharged to a National Pollution Discharge Elimination System (NPDES) permitted outfall in Harberts Creek.

Based on the RI sample results and field observations, the COCs are found within the sewage sludge application areas. The RI reported that aluminum, arsenic, beryllium, chromium, manganese, silver, and thallium were detected at concentrations exceeding USEPA Region 9 residential criteria. However, background samples of arsenic and beryllium also exceed USEPA criteria and the concentrations in subsurface soils are consistent with those background levels.

Elevated arsenic concentrations were detected in sediment samples from Harberts Creek. Concentrations similar in magnitude were previously noted in stream sediments and were determined to be consistent with elevated background levels identified for the entire JPG area. Sediment also contained aluminum, beryllium, chromium, iron, manganese, and vanadium at concentrations above USEPA Region 9 residential criteria.

Although the outfall to Harberts Creek is monitored to satisfy NPDES permit requirements, bypass releases have occurred in the past and may have resulted in the release of contaminants to surface water and sediments. It is suspected that the spent chemicals from the water quality laboratory were previously processed through the sewage treatment plant. This may have resulted in contamination of surface water and sediments in Harberts Creek if removal of the contaminants through the primary and secondary treatment processes was incomplete. There have also been reports in the past that during high flow, or heavy rain events, untreated wastewater bypassed the treatment system and was discharged directly into Harberts Creek.

## **5.3 Sites 3 - Explosive Burning Area and 4 - Abandoned Landfill and The New Burn Site**

Sites 3/4 are contained in an approximately 3-acre open field south of Engineers Road and East of Papermill Road (Figure 2). This area contains the Abandoned Landfill (Site 4), which occupies about 1 acre of the eastern side of the field. The Explosive Burning Area (Site 3) consists of the remaining open

area. A third area, the New Burn Site, consisting of a narrow trench approximately 5 ft deep, is located east of Papermill Road but to the west of Sites 3/4.

Site 3, the Explosive Burn Area, consists of surface soil contamination that contains aluminum, manganese, and thallium in concentrations exceeding USEPA Region 9 residential PRGs.

The second area, the landfill trench, contains soils contaminated with metals, semi-volatile organic compounds (SVOCs), and one volatile organic compound (VOC) (trichloroethene). Aluminum, arsenic, barium, beryllium, cadmium, chromium, copper, and lead were found to exceed USEPA Region 9 residential PRGs and were retained as COPCs in soils.

The third area, the New Burn Site, contains soil contaminated with lead, zinc, dioxins/furans, several polycycloaromatic hydrocarbon (PAH)-related SVOCs (e.g., benzo (a) pyrene, and the pesticide 2,2-Bis(p-chlorophenyl)-1,1-dichloroethene (DDE). The probability of finding UXO during excavation is extremely low.

Groundwater downgradient of Sites 3/4 was found to contain several metals exceeding their respective background concentrations and minor organic contamination. Of these contaminants, aluminum, antimony, arsenic, cobalt, iron, lead, manganese, molybdenum, and 4-amino-2,6-dinitrotoluene were retained as COPCs for groundwater. Groundwater downgradient of the landfill trench migrating along the till/bedrock interface contained several VOCs, including trichloroethene that exceeded its MCL.

#### **5.4 Sites 7/21B - Red Lead Disposal Area and Temporary Storage Area**

Building 211 is located along Woodfill Road just west of the intersection with Meridian Road (Figure 2). It had been previously used for the loading of inert ordnance. Both the red lead disposal area (Site 7) and the temporary storage area (Site 21B) are located south of Building 211 near the west end of the building. The area (including the building) is less than 1 acre. At the time of the RI, there was red staining in the area between the building and the railroad tracks and also in one place on the gravel between the railroad tracks.

The area around Building 211 is generally flat except where there is a shallow narrow ditch between the railroad tracks and Building 211. Surface water collects in this ditch and probably infiltrates into the soil. It is possible that if enough runoff enters the ditch, the water might run west and enter the storm water drains. The drains in this part of the installation eventually discharge into Harberts Creek.

An interim removal was performed in 1996 to excavate contaminated soil. This was verified by confirmation samples within the excavated area.

Groundwater results for metals indicated that arsenic is the primary contaminant in Site 7 wells and exceeds the USEPA Region 9 Tap Water PRG. The source of the elevated arsenic levels is unknown since arsenic was at background levels in the soils at Site 7. Well MW93-10, located upgradient of Site 7, also contained elevated arsenic indicating that the contamination is likely naturally occurring.

Soils immediately surrounding Site 21B were removed during the interim removal action. Confirmation sampling indicated that one sample location had the metals aluminum, barium, beryllium, and manganese exceeding their USEPA Region 9 residential PRG. However, as indicated in Table 7-1, these do not pose a risk for the intended land use.

The results for three wipe samples collected indoors indicate that a number of unknown SVOCs are present where samples were collected from surfaces coated with oily residues. The metals detected in the wipe samples are boron, barium, copper, manganese, lead, and zinc. The detection of bis(2-ethylhexyl)phthalate, a common plasticizer, are related to either the use of a plastic template for the wipe sampling or to laboratory-introduced contamination.

Groundwater flow is to the southwest and contamination is somewhat uncertain. Arsenic is the only COC in groundwater at the site. Arsenic groundwater concentrations are above background and exceed the MCL of 10 µg/L (effective January 23, 2006) in six of the eight site monitoring wells. These six monitoring wells are screened at the till/bedrock interface, whereas the other two wells are deeper bedrock wells. Thus the occurrence of the arsenic concentrations in groundwater is relatively shallow and is associated with the unconsolidated glacial till. Because of the soil interim removal action, the other identified COCs that may have impacted groundwater have been removed. Groundwater monitoring is expected to demonstrate that arsenic concentrations at this site are not increasing and are naturally occurring, in which case there is no statutory requirement to remediate this groundwater for arsenic.

## **5.5 Sites 9/10 - Gate 19 Landfill and Burning Ground South of Gate 19 Landfill**

The Gate 19 Landfill and the associated former burning ground are located at the far west end of the Firing Line north of the intersection of Firing Line Road and West Perimeter Road. The Gate 19 Landfill is a 12-acre landfill that includes an asbestos-disposal area and a waste pile of construction debris. The Site 10 landfill was closed under IDEM Solid Waste regulations and approved closure plans in 1995 with placement of a synthetic membrane and clean soil cover. The site is included in the May 2000 MOA between the Army, Air Force, and USFWS.

The Site 9 Burning Ground, a ½-acre area used for the open burning of construction debris and waste propellants, was reportedly located in the southern part of the Gate 19 Landfill (Figure 2). The burning area, which was used between the 1950s and 1970s, reportedly also received trichloroethene and paint waste. The area lies just south of the landfill and is currently overgrown with vegetation, making the burning area not readily discernable.

Human activities at Sites 9 and 10 are currently limited to occasional access by turkey and deer hunters and by investigation and maintenance personnel because the sites are located north of the Firing Line.

The area is flat to gently rolling, and most surface-water runoff appears to flow toward a small pond at the southwestern corner of the area. This pond also receives runoff from a ditch that flows west along Firing Line Road from as far away as Building 602. Installation personnel reported that the pond is an abandoned rock quarry that predates JPG. The pond discharges to the west via a small drainage swale, and the water runs through open farmland until it enters Middle Fork Creek about a quarter of a mile west of the installation boundary.

Surface soils contain metals contamination and subsurface soils, at both the landfill and the Burning Ground, contain metals at concentrations exceeding USEPA Region 9 criteria. Subsurface soils at the Burning Ground contain PAHs as well. Sediments at the landfill pond contain aluminum, beryllium, and manganese and pond surface water contains manganese and 1,3,5-trinitrobenzene at concentrations exceeding USEPA Region 9 criteria.

Middle Fork Creek sediment sampling indicated iron at levels exceeding USEPA Region 9 criteria, however water sampling indicated no exceedances.

Groundwater contained metals (arsenic, beryllium, cobalt, lead, and manganese) at concentrations exceeding USEPA Region 9 Tap Water PRG.

## **5.6 Site 12A - Building 602 Solvent Pit**

Building 602 is located just north of Woodfill Road about one-third of a mile west of Tokyo Road (Figure 2). Building 602, a former ammunition-assembly plant, was being used as an employee break area and a boiler plant at the time of the Phase I RI. Since facility closure in 1995, the building is no longer in use.

Building 602 was previously the site of a 25,000-gallon leaking UST that was removed in 1988. The associated contaminated soils were also excavated.

The solvent disposal pit (3-ft diameter, 3 ft deep), located immediately adjacent to Building 602 resulted in VOC contamination of the surrounding soils. A removal action was performed in 2000 that removed approximately 140 tons of VOC-contaminated soil in the vicinity of the solvent pit. Confirmation sampling, performed to assess effectiveness of this removal action, indicated that soils exceeded USEPA Region 9 residential PRGs along the foundation wall. An additional 4-ft depth was excavated along the foundation wall. Some soil parameters at the foundation wall (at this 12-ft depth) exceeded USEPA Region 9 residential PRGs. However, additional excavation was not performed due to the proximity of building structures and the potential for undermining those structures.

Groundwater VOC contamination appears to have migrated vertically downward from the former solvent pit through vertical fractures in the glacial till. The lateral extent of VOC contamination is limited in the glacial till based on the lack of detection of significant concentrations in the boreholes or probeholes surrounding the solvent pit. These results indicate that VOC concentrations in the glacial till reduce rapidly with lateral distance from the pit, indicating that the solvents infiltrated downward to the groundwater before migrating laterally. Lateral migration of the VOC contamination occurred at the bedrock/till interface where greater horizontal permeability was encountered. Based on analytical data, the VOC plume has migrated generally to the southeast and appears to be stable at a downgradient distance of 270 feet from the former solvent pit. The principal COCs in groundwater are 1,1,1-trichloroethane and 1,1-dichloroethylene with concentrations ranging from non detect to 94,000 µg/L. The observed extent of contamination supports the conclusion that groundwater is generally moving to the southeast.

Site 12A was assessed as a candidate for natural attenuation using the USEPA screening criteria contained within the BIOCHLOR model (USEPA, 2000). Based on this assessment, Site 12A is a strong candidate site for natural attenuation by reductive dechlorination.

## **5.7 Site 12B - Building 617 Solvent Pit**

Building 617 is located north of Woodfill Road about one-third of a mile east of Tokyo Road (Figure 2). Building 617 was an ammunition-assembly plant in the past. The solvent disposal pit (3-ft diameter, 3 ft deep), located immediately adjacent to the building, resulted in VOC contamination of the surrounding soils.

Three steel USTs, used to store fuel oil, were formerly located south of Building 617. The tanks and associated contaminated soil have since been removed.

A removal action was performed in 2000 that removed approximately 130 tons of VOC-contaminated soil in the vicinity of the solvent pit. Confirmation sampling was performed to assess effectiveness of this removal action. Excavation was performed to a depth of 8 ft and confirmation sampling indicated that soils along the foundation wall exceeded USEPA Region 9 residential PRGs. Excavation continued an additional 4 ft along the foundation wall. Some soil parameters at the foundation wall (at this 12-ft depth) exceeded USEPA Region 9 residential PRGs. However, additional excavation was not performed due to the proximity of building structures and the potential of undermining those structures.

Groundwater VOC contamination appears to have migrated vertically downward from the former solvent pit through vertical fractures in the glacial till. The lateral extent of VOC contamination is limited in the glacial till based on the lack of detection of significant concentrations in the boreholes or probeholes surrounding the solvent pit. These results indicate that VOC concentrations in the glacial till reduce rapidly with lateral distance from the pit, indicating that the solvents infiltrated downward to the groundwater before migrating laterally. Lateral migration of the VOC contamination occurred at the bedrock/till interface where greater horizontal permeability was encountered. Based on analytical data, the VOC plume has migrated generally to the southwest and appears to be stable at a downgradient distance of 600 ft from the former solvent pit. The principal COCs in groundwater are 1,1,1-trichloroethane and 1,1-dichloroethylene with concentrations ranging from non detect to 33,000 ug/L. The observed extent of contamination supports the conclusion that groundwater is generally moving to the southwest.

In addition, the results from the groundwater samples collected in the deep bedrock wells indicates that elevated concentrations of VOCs are also present in the dolomite bedrock from the bedrock/till interface to the dolomite/shale interface. The shale is an aquitard that limits further vertical migration below the dolomite. This VOC plume in the dolomite extends southwest from the former solvent pit for an approximate distance of 350 ft. The lateral extent of this plume is defined by four other deep bedrock monitoring wells, located around the former source area, that did not have VOCs detected.

Site 12B was assessed as a candidate for natural attenuation using the USEPA screening criteria contained within the BIOCHLOR model (USEPA, 2000). Based on this assessment, Site 12B is an adequate candidate site for natural attenuation by reductive dechlorination.

## **5.8 Site 12C - Building 279 Solvent Pit**

Building 279, a former ammunition-assembly plant, is located 1 block north of Woodfill Road and 2 blocks west of Meridian Road along the Firing Line (Figure 2). The building is no longer used. The site is located north of the firing line and therefore will not be the subject of a property transfer.

The solvent disposal pit (3-ft diameter, 3 ft deep), located immediately adjacent to Building 279, resulted in VOC contamination of the surrounding soils.

A removal action was performed in 2000 that removed approximately 40 tons of VOC-contaminated soil in the vicinity of the solvent pit. Confirmation sampling was performed to assess effectiveness of this removal action. Results indicated no exceedances of USEPA Region 9 residential PRGs.

Solvent contamination is limited in the glacial till to the immediate vicinity of the former solvent pit. No bedrock groundwater VOC contamination was detected at this site. Also, the probehole data indicate that solvent-contaminated groundwater in the glacial till is mostly restricted to the immediate area near the solvent pit. The principal COCs in groundwater are 1,1,1-trichloroethane and 1,1-dichloroethylene with

concentrations ranging from non detect to 790 ug/L. Because the bedrock groundwater beneath the former solvent pit is not contaminated, vertical migration is limited.

Site 12C was assessed as a candidate for natural attenuation using the USEPA screening criteria contained within the BIOCHLOR model (USEPA, 2000). Based on this assessment, Site 12C is a strong candidate site for natural attenuation by reductive dechlorination.

## **5.9 Site 14 - Yellow Sulfur Disposal Area**

The yellow sulfur disposal area is located just west of the intersection of Papermill Road and Infantry Road (Figure 2). In addition to sulfur, other debris such as melted glass was present. The source of these materials was not determined. Sulfur was observed extending for about 50 ft from a gravel road down to an intermittent drainage swale.

An interim removal action was conducted in the area containing the yellow sulfur (approximately an area of 3,750 sf). As excavation activities progressed, unexploded ordnance (UXO) was encountered and the excavation activities were halted. The stockpiled soils were transported to an area north of the Firing Line for temporary storage in a bermed and plastic-lined containment area to allow screening of the soil for possible UXO prior to off-site disposal. EOD destroyed the rounds and declared them to be inert, thus the probability of finding live munitions at this site is now low. In late January and early February 1997, excavation activities resumed and the soils were moved to the stockpile area north of the Firing Line and covered with plastic.

During the excavation activities, confirmation sampling was performed at Site 14 to assess the adequacy of the removal action. The sample results indicated that most metals are at levels below USEPA Region 9 residential PRGs. One exception is chromium, which was found to exceed the criteria in six samples. In spite of these elevated chromium results, groundwater data at Site 14 show that chromium is at background levels. This indicates that chromium contamination in the subsurface soils has not migrated vertically to the groundwater pathway.

Arsenic concentrations in groundwater were consistent with background concentrations for JPG. Soil pH was found to range from 2.3 to 7.6 with 13 of the 24 samples having a pH of less than 4, indicating that an acidic environment still exists within portions of the yellow sulfur area following contaminant removal.

Based on additional UXO screening conducted during the ecological risk assessment sampling in September 1997, UXO may potentially exist outside the open excavation in the shallow subsurface (within 2 ft of the surface). UXO was also encountered during excavation of the yellow sulfur contamination. Additional UXO screening and removal would be necessary before allowing unrestricted access to the site.

To summarize, based on the RI sampling results and interim measures confirmation sampling, chromium contamination exceeding USEPA Region 9 residential PRG exists in subsurface soils at Site 14. However, based on the risk assessment, no remedial action is required. Continuation of the current interim measures removal action should include additional excavation and disposal based on an agreed upon cleanup goal for chromium in soil. In groundwater, arsenic contamination was present in all four wells at levels exceeding USEPA Region 9 Tap Water PRGs.

## **5.10 Sites 21A/30 - Building 204 Temporary Storage Area**

Building 204 is located one block east of the intersection of Woodfill Road and Meridian Road (Figure 2). A variety of pesticides and herbicides have been stored in Building 204. A small metal shed southeast of Building 204 was used for mixing and rinsing pesticides and herbicides. Spills of these materials during loading, unloading, storage, or mixing may have resulted in a release of contaminants to environmental pathways. The integrity of the concrete slab within the building was evaluated by USACE and found to be in good condition, therefore, no sampling of soils beneath the concrete slab will be performed. The probability of finding UXO during excavation is considered to be extremely low.

Some soil pesticide contamination (dieldrin) is present around the building. No significant residual contamination remains inside the building related to any unreported releases, therefore no clean up is required.

## **5.11 No Further Action Sites**

Thirty-nine (39) sites were recommended for NFA because they did not pose an unacceptable risk to human health and the environment exceeding USEPA risk-based criteria, or because they were being addressed under another program (i.e., asbestos abatement and UST removal programs). In addition, of these 39 sites, two sites (Sites 5 and 6) had a Decision Document prepared and approved in 2001, leaving 37 NFA sites. Table 5-1 identifies the 37 NFA sites, provides a brief description, and presents the rationale for removing the sites from the CERCLA process.

This ROD serves to document the NFA decision at these 37 sites.

[END OF SECTION]

## **6 CURRENT AND POTENTIAL SITE AND RESOURCES USES**

This section discusses the current and reasonably anticipated future land uses of JPG.

### **6.1 Current Land Use**

JPG is surrounded by several small rural towns, including New Marion, Holton, Nebraska, Rexville, Grantsburg, Belleview, Middlefork, San Jacinto, and Wirt. The area immediately adjacent to the installation is used predominantly for small family farms. Approximately 100 farmhouses and other dwellings are located within 1 mile downgradient of JPG south of the Firing Line. The major local crops are tobacco, corn, and soybeans, and little change is expected in the foreseeable future.

The installation consists of industrial buildings, former workshops, and former test facilities, as well as administrative buildings and former personnel housing in the area south of the Firing Line. A major portion of JPG is wooded and the remainder is open grassland. Since final closure of the facility in the fall of 1995, a local businessman has leased the area south of the Firing Line and is currently farming approximately 800 acres of this area. He, in turn, has subleased a number of the buildings to private companies. About 32 private individuals under the local businessman's subleases currently occupy the previous military housing area, which includes Buildings 1, 3, 4, 7, 8, 11, 12, 15, 16, 17, 20, 21, 23, and 33. Over 2,000 acres has been transferred to the local businessman. Approximately 220 acres has been deeded to Jefferson County. Ownership of the entire area south of the Firing Line will eventually be transferred following completion of remedial action activities.

The 51,000-acre area north of the Firing Line will remain under Army ownership with the Indiana Air Guard utilizing the approximate 1,000-acre range under license for training exercises. The U.S. Fish and Wildlife Service (USFWS) manages approximately 50,000 acres as the Big Oaks National Wildlife Refuge through a memorandum of agreement.

The facility-wide conceptual model included in the RI includes the current land use scenario as a closed, fenced, former munitions/weapons testing facility and possible future land use scenario(s). This conceptual model was developed to address the potential for facility-wide risks (i.e., multiple sites) to currently impact receptors located both on- and off-site.

### **6.2 Future Land Use**

The future land use for each of the 15 sites is as follows:

Site 1	Industrial Use
Site 2/27	Industrial Use
Site 3/4	Currently intended for Agricultural Use, however, may change to residential; therefore remediation will be performed to meet USEPA Region 9 Residential PRGs.

Site 7/21B	Industrial Use
Site 9/10	Wildlife Refuge. Site (located north of the Firing Line) will not be transferred out of Army Control. Current access restrictions will be maintained indefinitely in accordance with the MOA signed by the Army, Air Force, and USFWS, dated May 2000.
Site 12A	Industrial Use
Site 12B	Industrial Use
Site 12C	Part of Big Oaks National Wildlife Refuge. Building 279 used for storage. Site evaluated as Industrial Use.
Site 14	Residential Use
Site 21A/30	Intended for Industrial Use, however, due to proximity to residential sites, site will be remediated to meet USEPA Region 9 Residential PRGs.

[END OF SECTION]

## **7 SUMMARY OF SITE RISKS**

A BIRA, conducted as part of the RI, identifies those analytes that are estimated to pose a risk to human health or the environment. These are termed Contaminants of Concern (COCs). The following is a brief overview of the process used in the BIRA to identify COCs and describes how the results of the BIRA were used to develop site-specific Remedial Action Objectives (RAOs).

Within the BIRA, analytes detected in soils and groundwater as a result of the RI were screened against USEPA Region 9 residential PRGs for each site. No air monitoring was done for purposes of the risk assessment as part of the RI. The soil data were used with air dispersion models to predict concentrations of analytes in air. This model was done assuming that site soils were not vegetated and that winds would generate dust 252 days per year and that residents would inhale the maximum dust concentrations possible on the property on all of these days. These modeled air concentrations were screened against USEPA Region 9 residential air PRGs. The USEPA Region 9 residential PRGs are generic human health-based guidelines that represent concentrations below which risks are so minimal that no further evaluation of risk to humans is considered necessary.

For each site, USEPA Region 9 residential PRGs were used as the initial screening to determine which chemicals would be further evaluated in the risk assessment. The more conservative residential PRGs were used because the future land use of each site was not determined at the time of the assessment. Those chemicals that were above the USEPA Region 9 residential PRGs are referred to as Chemicals of Potential Concern (COPCs), which means they require further evaluation within the risk assessment to determine if they are COCs.

The risk assessment evaluated the combined effects of the multiple COPCs identified at each site under one or more exposure scenario (e.g., residential, industrial, agricultural, and/or recreational land use). If the potential chemical exposure under the particular land use was estimated to be below the USEPA health risk goals, the site was not considered to pose a human health risk.

The potential for ecological risks associated with chemicals followed a similar process. If the risk goals were met for both human and ecological receptors, then the site was not carried forward to the FS.

In the FS, the risks evaluated in the BIRA for each site were reviewed with respect to the future land use and RAOs were developed to focus the development of alternatives on those that would achieve target levels for each site.

### **7.1 Human Health Risk Assessment**

Human health risk estimates were made for site-related contaminants that can cause cancer (carcinogens) and for non-cancer causing compounds (non-carcinogens). The NCP establishes acceptable levels of carcinogenic risk for Superfund sites as ranging from 1 in 10,000 ( $1 \times 10^{-4}$ ) to 1 in one million ( $1 \times 10^{-6}$ ) excess cancer cases. "Excess" means the number of cancer cases in addition to those that would ordinarily occur in a population due to non-site-related factors. For non-cancer causing compounds, a risk estimation known as the "hazard index" is used. Typically, hazard indices below one (1.0) indicate that no adverse health effects are expected, and values above 1.0 are indicative of possible adverse effects.

Risks and hazards posed to receptors were calculated for the 15 sites addressed in the FS. The human health risks associated with each site are presented in Table 7-1.

## **7.2 Ecological Risk Assessment**

In addition to the human health risk assessment, an ecological risk assessment was conducted as part of the RI. The potential for ecological risks associated with chemicals followed a similar process as human health risk assessment. Table 7-1 summarizes the ecological risk associated with the 15 sites that were evaluated in the FS.

[END OF SECTION]

## **8 REMEDIAL ACTION OBJECTIVES**

The primary remedial action objective (RAO) of the cleanup at JPG is to mitigate unacceptable risk to human health and the environment. The RAOs, based on the risks associated with the contaminants of concern for the intended future land use, are summarized in Table 8-1.

[END OF SECTION]

## **9 DESCRIPTION OF ALTERNATIVES**

The alternatives evaluated for the 15 sites carried forward to the FS are described in this Section.

### **9.1 Site 1 - Building 185 Incinerator**

Based on further risk evaluation of the exposure pathways of concern for Site 1, there are no complete exposure pathways that would warrant carrying Site 1 into remediation. Being that the site already meets USEPA Region 9 residential PRGs for the COC defined in the risk assessment (i.e., manganese), and the site is intended for industrial use, there is no practical need for further assessment. Although the dioxin concentrations detected at Site 1 are comparable to background concentrations and therefore do not require evaluation in the risk assessment, the Army has agreed to limit Site 1 from residential use via institutional controls. Deed restrictions will be implemented to prevent residential use. This LUC will be maintained and a Five-Year Review will be performed as long as contamination exists that prevents unrestricted access or reuse of this site.

### **9.2 Sites 2/27 - Sewage Treatment Plant Area**

Based on the evaluation of potential risks at Sites 2/27, there is no human health risk or concern for these sites under the future industrial land use scenario that would warrant remediation. Therefore, deed restrictions will be placed on the property to prohibit other land uses. This LUC will be maintained and a Five-Year Review will be performed as long as contamination exists that prevents unrestricted access or reuse of these sites.

### **9.3 Sites 3- Explosive Burning Area, and 4 - Abandoned Landfill and The New Burn Site**

#### **Alternatives for Soils - the Trench Area and the New Burn Site**

After review of the applicable general response actions and process options for soils in the FS, the following three RA alternatives were retained for further development:

- |               |   |
|---------------|---|
| Alternative 1 | No-Action                               |
| Alternative 2 | Limited Action (Institutional Controls) |
| Alternative 3 | Excavation and Disposal                 |

**Soils Alternative 1: No-Action.** Under this alternative, the Army would take no action and the contaminated soils would remain in place. This alternative would not eliminate or reduce the exposure to the contaminants of concern. Human health RAOs would not be met and the existing risk to humans and the environment would remain.

**Soils Alternative 2: Limited Action (Institutional Controls) for Sites 3/4.** This alternative would include deed restrictions limiting the use of the sites for residential use. In addition, fencing would be included to prevent contact with soils. By placing permanent restrictions on land use, this alternative would protect future residents from health risks due to ingestion or contact with soils. This alternative would comply with applicable action-and location-specific Applicable or Relevant and Appropriate Requirements (ARARs) and would be protective of human health and the environment.

**Soils Alternative 3: Excavation and Disposal for Soils at Sites 3/4.** This alternative assumes excavation would be done of the Trench soils and the soils at the New Burn Site with confirmation testing to assess that USEPA Region 9 residential PRGs are met. The soils would be transported for disposal at a licensed landfill following characterization testing. This alternative would meet human health and environmental RAOs for possible future residents, thus would be protective of human health and the environment over the long term for unrestricted use. There would be no reduction in toxicity or volume of the soil itself but JPG would have a reduction in soil toxicity and mobility would be reduced by disposal in a properly constructed licensed landfill.

#### **Alternatives for Groundwater - Sites 3/4**

Prior to selection of an alternative for Sites 3/4, two monitoring wells were installed as sentry groundwater monitoring locations between monitoring well MW01-03 and Harberts Creek. Both of these monitoring wells were screened at the bedrock/till interface and monitored for VOCs. The two wells were incorporated into the remedy selected below and assigned a role in potential future groundwater monitoring at the sites.

Alternative 1    No-Action

Alternative 2    Limited Action (Institutional Controls and Monitoring)

Groundwater remediation alternatives presume that contaminated soil removal as described in Soil Alternative 3 would be implemented. Besides addressing the potential risks that the soil poses to human health and the environment through direct contact or incidental ingestion or inhalation, the removal of these soils will also eliminate a potential continuing source of contaminants to groundwater.

In addition, the groundwater remediation alternative assumes that the results of testing for chromium (VI) will be negative.

**Groundwater Alternative 1: No-Action.** For the No-Action alternative, the contaminated groundwater remains and drinking water MCLs would not be met. This alternative would not be protective of human health and the environment.

**Groundwater Alternative 2: Limited Action (Institutional Controls and Monitoring).** This Limited Action alternative would not involve active remediation; groundwater would be left in place. However, this alternative would limit the potential for human and fauna exposure to site contaminants by placing restrictions preventing the usage of water from existing or future wells. Groundwater monitoring would be performed to assess the progress of intrinsic biodegradation of VOCs in groundwater. Additional monitoring for chromium will be added if it is determined that chromium IV is present, otherwise monitoring for chromium will be discontinued. The long-term monitoring program would be identified in the Remedial Action (RA) workplans and would have concurrence of the regulatory agencies. By placing permanent restrictions on water usage through well permitting regulations and by land use deed restrictions, this alternative would protect future residents from health risks due to ingestion or contact with on-site well water regardless of disposition of soil contamination.

### **9.4 Sites 7/21B - Red Lead Disposal Area and Temporary Storage Area**

No remedial action is required for soil at Sites 7/21B. Therefore, alternatives were only evaluated for groundwater.

Because the groundwater contamination poses no current threat to human health and the elevated arsenic may be naturally occurring, the alternatives developed include:

Alternative 1 – No-Action

Alternative 2 – Limited Action (Institutional Controls and Monitoring)

Alternative 3 – Collection and Treatment

**Groundwater Alternative 1: No-Action.** This alternative would not involve active remediation, i.e., site water would be left in place. This alternative meets the RAO under current conditions. However, it would not meet the objectives for future exposure scenarios. Drinking water MCLs would not be met by this alternative.

**Groundwater Alternative 2: Limited Action (Institutional Controls with Monitoring).** This alternative would not involve active remediation; site water would be left in place. However, this alternative would limit the potential for human and fauna exposure to site contaminants by restricting groundwater usage. This alternative would include land use restrictions to prevent future usage of the contaminated groundwater. Groundwater monitoring would include periodic groundwater sampling to evaluate groundwater chemistry and natural dilution and dispersion. This alternative would meet the RAO under current and future conditions by restricting usage of the groundwater. Drinking water MCLs would not be met by this alternative, although exposure would be limited. However, the occurrence of arsenic may be determined through monitoring to be naturally occurring, in which case there is no statutory requirement to remediate the groundwater for arsenic.

**Alternative 3: Collection and Treatment.** This alternative would involve collecting the contaminated water and on-site treatment to remove metals. A pumping system would collect the water to reduce arsenic concentrations and control groundwater flow, followed by a relatively simple chemical precipitation treatment, after which the clean water would be disposed of to the existing surface water system and the collected metals disposed of in a regulated landfill. Because arsenic would be removed from the groundwater, this alternative would meet the RAOs. Arsenic concentrations may be reduced to MCLs. However, the occurrence of arsenic may be determined through monitoring to be naturally occurring, in which case there is no statutory requirement to remediate the groundwater for arsenic.

## **9.5 Sites 9/10 - Gate 19 Landfill and Burning Ground South of Gate 19 Landfill**

Sites 9 and 10 are located north of the Firing Line, and will not be transferred out of Army ownership. The planned future land use for these two sites is incorporation into the current refuge system. Based on this intended land use, there are no exposure pathways that would pose a human health or ecological concern.

Sites 9 and 10 are recommended for NFA, Restricted Use. Fencing currently restricts the area north of the Firing Line. Sites 9 and 10 will not be transferred for public use and restricted access will be maintained indefinitely. The May 2000 MOA between the Army, Air Force, and USFWS for Sites 9/10 addresses the security access control plan, which states that the Army is required to approve all land uses.

## **9.6 Site 12A - Building 602 Solvent Pit**

No remedial action is required for soil at Site 12A based on the interim removal action confirmation test results. Therefore, alternatives were only evaluated for groundwater.

After review of the applicable response actions and process options, the following three RA alternatives were formulated for groundwater remediation:

Alternative 1	No-Action
Alternative 2	Limited Action (Institutional Controls with Monitoring)
Alternative 3	Collection and Treatment

Two monitoring wells were installed and screened across the till/loess interface. The wells were monitored for VOCs to evaluate the effect of the solvent pit removal on groundwater. The new wells were incorporated into the preferred remedy.

**Groundwater Alternative 1: No-Action.** Under this alternative, site water would remain without change except through potential natural attenuation. This alternative would not meet the RAOs for possible future residents. Drinking water MCLs would not be met by this alternative unless natural attenuation processes reduce the contaminant levels in the groundwater over time.

**Groundwater Alternative 2: Limited Action (Institutional Controls and Monitoring).** This alternative would not involve active remediation; site water would be left in place. However, this alternative would limit the potential for human and fauna exposure to site contaminants by restricting groundwater use. These controls would include well drilling restrictions and monitoring. Deed and/or land use restrictions would be developed for future protection if the property were released to the public. This option would limit risk to human health and the environment until monitoring determined that groundwater VOC contamination was reduced below ARARs.

**Groundwater Alternative 3: Collection and Treatment.** This alternative would involve collection of the hydrocarbon-water mixture utilizing wells and pumping systems. The mixture would be processed in an on-site treatment system and disposed of into the existing surface water system following treatment. Because VOC contamination would be removed from the groundwater, this alternative would meet the RAOs. VOC concentrations would be reduced to below the ARARs. By treating the collected water, human health remediation goals would be met for future receptors. The property could be released without restriction in the future when groundwater treatment has been shown to be successful and RAOs have been met.

## **9.7 Site 12B - Building 617 Solvent Pit**

No remedial action is required for soil at Site 12B based on the interim removal action confirmation test results. Therefore, alternatives were only evaluated for groundwater.

After review of the applicable response actions and process options, the following three RA alternatives were formulated for groundwater remediation:

Alternative 1	No-Action
Alternative 2	Limited Action Institutional Controls with Monitoring)
Alternative 3	Collection and Treatment

Three monitoring wells were installed and screened across the till/loess interface downgradient of the former solvent pit. The new wells were monitored for VOCs to evaluate the effect of the solvent pit removal on groundwater. One additional well was installed at the till/bedrock interface to fill a potential data gap in the monitoring array. The new wells were incorporated in to the remedy selected for the site.

**Groundwater Alternative 1: No-Action.** Under this alternative, site water would remain without change except through possible natural attenuation. This alternative would not meet the RAOs for possible future residents. Drinking water MCLs would not be met by this alternative unless natural attenuation processes reduce the contaminant levels in the groundwater over time.

**Groundwater Alternative 2: Limited Action (Institutional Controls with Monitoring).** This alternative would not involve active remediation; site water would be left in place. However, this alternative would limit the potential for human and fauna exposure to site contaminants by restricting groundwater use. These controls would include well drilling restrictions and monitoring. Deed and/or land use restrictions would be developed for future protection if the property is released to the public. This option would limit risk to human health and the environment until monitoring determined that groundwater VOC contamination was reduced below ARARs.

**Groundwater Alternative 3: Collection and Treatment.** This alternative would involve collection of the hydrocarbon-water mixture utilizing wells and pumping systems. The mixture would be processed in an on-site treatment system and disposed of into the existing surface water system following treatment. Because VOC contamination would be removed from the groundwater, this alternative would meet the RAOs. VOC concentrations would be reduced to below the ARARs. By treating the collected water, human health remediation goals would be met for future receptors. The property could be released without restriction.

## **9.8 Site 12C - Building 279 Solvent Pit**

No remedial action is required for soil at Site 12C based on the interim removal action confirmation test results. Therefore, alternatives were only evaluated for groundwater.

After review of the applicable response actions and process options, the following three RA alternatives were formulated for groundwater remediation:

Alternative 1	No-Action
Alternative 2	Limited Action (Institutional Controls with Monitoring)
Alternative 3	Collection and Treatment

**Groundwater Alternative 1: No-Action.** Site water would remain without change except through possible natural attenuation. This alternative would not meet the RAOs for possible future residents. Drinking water MCLs would not be met by this alternative unless natural attenuation processes reduce the contaminant levels in the groundwater over time. This alternative would not likely be protective of human health and the environment over the long term.

**Groundwater Alternative 2: Limited Action (Institutional Controls with Monitoring).** This alternative would not involve active remediation; site water would be left in place. However, this alternative would limit the potential for human and fauna exposure to site contaminants by restricting groundwater usage. These controls would include well drilling restrictions and monitoring. Deed and/or land use restrictions would be developed for future protection if the property is released to the public. This option would limit risk to human health and the environment until monitoring determined that groundwater VOC contamination was reduced below ARARs.

**Groundwater Alternative 3: Collection and Treatment.** This alternative would involve collection of the hydrocarbon-water mixture utilizing wells and pumping systems. The mixture would be processed in

an on-site treatment system and disposed of into the existing surface water system following treatment. Because VOC contamination would be removed from the groundwater, this alternative meets the RAOs. By treating the collected water, human health remediation goals would be met for future receptors. The property could be released without restriction. This alternative would reduce the contaminant toxicity, mobility, and volume from the sites utilizing a treatment process.

## **9.9 Site 14 - Yellow Sulfur Disposal Area**

There is no remedial action required for soil at Site 14 based on the risk assessment. However, additional excavation and disposal of chromium contaminated soils at Site 14 will be performed to complete the previous removal action activities and remove a potential source for groundwater contamination. Confirmation sampling will be performed until remaining soils meet the USEPA Region 9 residential PRGs.

Alternatives were evaluated for groundwater. After review of the applicable response actions and process options, the following three alternatives were formulated for groundwater remediation:

Alternative 1	No-Action
Alternative 2	Limited Action (Institutional Controls and Monitoring)
Alternative 3	Collection and Treatment

**Groundwater Alternative 1: No-Action.** Under this alternative, site water would remain without change except through possible natural attenuation. This alternative would not meet the RAOs for possible future residents. Drinking water MCLs are not met by this alternative unless natural attenuation processes reduce the contaminant levels in the groundwater over time.

**Groundwater Alternative 2: Limited Action (Institutional Controls and Monitoring).** This alternative would not involve active remediation; site water would be left in place. However, this alternative would limit the potential for human and fauna exposure to site contaminants by restricting groundwater usage. Deed and/or land use restrictions would be developed for future protection if the property were released to the public. This option would not preclude risk to human health and the environment unless monitoring demonstrated that groundwater arsenic contamination was reduced below ARARs.

**Groundwater Alternative 3: Collection and Treatment.** This alternative would involve collecting the contaminated water and treating it to remove metals. A pumping system would collect the water to reduce arsenic concentrations and control groundwater flow, followed by a relatively simple chemical precipitation treatment after which the clean water would be disposed of to the existing surface water system and the collected metals disposed of in a regulated landfill. Because arsenic contamination would be removed from the groundwater, this alternative will likely meet the RAOs. Arsenic concentrations may be reduced to MCLs. However, the occurrence of arsenic may be determined through monitoring to be naturally occurring, in which case there is no statutory requirement to remediate the groundwater. By treating the collected water, human health remediation goals may be met for future receptors. The property could be released without restriction.

## **9.10 Sites 21A/30 - Building 204 Temporary Storage Area**

No remedial action is required for groundwater at Sites 21A/30. Therefore, alternatives were only evaluated for soil.

Three RA alternatives were evaluated for soil contaminants at Sites 21A/30, as follows:

Alternative 1	No-Action
Alternative 2	Limited Action (Institutional Controls)
Alternative 3	Excavation and Disposal

**Soils Alternative 1: No-Action.** Under this alternative, site soil would remain in place. This alternative would not meet the RAOs if, in the future, a residence is built on the site. There would be no long-term or permanent reduction in risk with this alternative.

**Soils Alternative 2: Limited Action (Institutional Controls).** This alternative would not involve active remediation; site soils would be left in place. However, this alternative would limit the potential for human and fauna exposure to site contaminants by placing controls on access to the site. Deed restrictions would be developed for future protection when the property is released to the public. The restrictions would prevent the use of the property for residential and industrial development. Construction of a fence around the small contaminated area plus deed restrictions would minimize exposure to the surface-contaminated soil by humans and grazing animals for future land use options. This option would not preclude risk to human health and the environment.

The human health risk assessment indicates that the residual risk for this alternative would meet current and future worker human health goals but would not meet future residential goals. By using fencing and deed restrictions to restrict access to and development of the area, human health remediation objectives could be met. In addition, restrictions on utilization of this land for agricultural purposes would be required based on the estimated risks from ingestion of dieldrin in homegrown produce.

**Soils Alternative 3: Excavation and Off-Site Disposal.** This alternative would include the removal of contaminated soil exceeding the USEPA Region 9 residential PRGs established for dieldrin. The use of standard lightweight excavation equipment could be utilized because of the relatively shallow and small area of contaminated soil. Confirmation samples would then be collected to verify that any residual contamination is below the USEPA Region 9 residential PRGs. Clean soil from an on-site borrow area would be used to backfill the excavation after the confirmation sample results are reviewed and approved. Removal and proper disposal of contaminated soils exceeding USEPA Region 9 residential PRGs would effectively reduce risk to human health and the environment due to both current and future potential exposure. The USEPA Region 9 residential PRGs would be met under this alternative. There would be no reduction of the toxicity, mobility, or volume of soil contaminants through treatment under this alternative, however JPG soils would have a reduction of toxicity.

[END OF SECTION

## **10 SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES**

This section evaluates and compares each of the alternatives described in Section 9.0 with respect to the nine criteria used to assess remedial alternatives established by CERCLA.

### **10.1 Nine Evaluation Criteria**

Nine evaluation criteria have been developed under CERCLA to address the requirements and considerations for remedial alternatives, and to address the additional technical and policy considerations that have proven to be important for selecting among remedial alternatives. The nine criteria are listed in Section 6.2.2 of *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA* (USEPA 1988) and described below. The first two are threshold criteria that must be met. The next five criteria are balancing criteria, and the remaining two are modifying criteria:

#### **Threshold Criteria**

1. ***Overall Protection to the Human Health and the Environment*** – The assessment against this criterion describes how the alternative, as a whole, achieves and maintains protection of human health and the environment.
2. ***Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)*** – The assessment against this criterion describes how the alternative complies with ARARs, or if a waiver is required and how it is justified. The assessment also addresses other information from advisories, criteria, and guidance that the lead and support agencies have agreed is “to be considered.”

#### **Balancing Criteria**

3. ***Long-term Effectiveness and Permanence*** – The assessment of alternatives against this criterion evaluates the long-term effectiveness of alternatives in maintaining protection of human health and the environment after response objectives have been met.
4. ***Reduction of Toxicity, Mobility, or Volume through Treatment*** – The assessment against this criterion evaluates the anticipated performance of the specific treatment technologies an alternative may employ.
5. ***Short-term Effectiveness*** – The assessment against this criterion examines the effectiveness of alternatives in protecting human health and the environment during the construction and implementation of a remedy until response objectives have been met.
6. ***Implementability*** – This assessment evaluates the technical and administrative feasibility of alternatives and the availability of required goods and services.
7. ***Cost*** – This assessment evaluates the capital and operation and maintenance (O&M) costs of each alternative.

#### **Modifying Criteria**

8. ***State Acceptance*** – This assessment reflects the state of Indiana’s (i.e., IDEM’s) apparent preferences among or concerns about alternatives.

9. ***Community Acceptance*** – This assessment reflects the community’s apparent preferences among or concerns about alternatives.

## **10.2 Summary of Comparative Analysis Alternatives**

Tables 10-1 through 10-8 provide a comparative analysis of each alternative for soil or groundwater at sites requiring remedial action, including Sites 3/4, 7/21B, 12A, 12B, 12C, 14 and 21A/30. Relative ranking of the three alternatives was made using a scale of 1 to 10, with 10 representing the most favorable alternative for the criteria being evaluated. The rankings were totaled for each alternative in the tables. Alternatives that have the highest relative ranking are selected as the preferred alternative. The recommended RAs for each site based on the rankings are:

<b><u>Site</u></b>	<b><u>Recommended Alternative</u></b>
Sites 3/4 Groundwater	Alternative 2 – Limited Action (Institutional Controls and Monitoring)
Sites 3/4 Soil	Alternative 3 – Excavation and Disposal
Sites 7/21B Groundwater	Alternative 2 – Limited Action (Institutional Controls with Monitoring)
Site 12A Groundwater	Alternative 2 – Limited Action (Institutional Controls and Monitoring)
Site 12B Groundwater	Alternative 2 – Limited Action (Institutional Controls and Monitoring)
Site 12C Groundwater	Alternative 2 – Limited Action (Institutional Controls and Monitoring)
Site 14 Groundwater	Alternative 2 – Limited Action (Institutional Controls and Monitoring)
Site 14 Soil	Excavation and Offsite Disposal to Complete Previous Removal Action
Sites 21A/30 Soil	Alternative 3 - Excavation and Off-Site Disposal

[END OF SECTION]

## **11 PRINCIPAL THREAT WASTE**

The NCP (NCP §300.430(a)(1)(iii)(A)) establishes an expectation that USEPA will use treatment to address the principal threats posed by a site wherever practicable. The “principal threat” concept is applied to the characterization of “source materials” at a Superfund site. A source material is material that includes or contains hazardous substances, pollutants or contaminants that act as a reservoir for migration of contamination to ground water, surface water or air, or acts as a source for direct contact. Examples of source materials are: Drummed wastes; contaminated soil and debris; “pools” of dense non-aqueous phase liquids (NAPLs) submerged beneath groundwater or in fractured bedrock; NAPLs floating on groundwater, contaminated sediments and sludges, etc (USEPA 1991). Contaminated groundwater, surface water and residuals resulting from treatment of site materials are generally not considered as source materials.

According to USEPA (1991), wastes that generally will be considered as principal threat wastes include:

- Waste liquid that contained in drums, lagoons or tanks, free product (NAPLs) floating on or under groundwater;
- Surface soil or subsurface soil containing high concentrations of contaminants of concern that are, or potentially are, mobile due to wind entrainment, volatilization, surface runoff, or subsurface transport;
- Highly toxic source material, such as buried drummed non-liquid wastes, buried tanks containing non-liquid wastes, or soils containing significant concentrations of highly toxic materials.

Based on the definition described above, contaminated groundwater at JPG is not considered to be a principal threat waste. The contaminants of concern in soil are mainly metals, which have little mobility or volatility. In addition, most of the sites are currently well vegetated so that contaminants in soils are not likely mobile. Therefore, the contaminated soils at JPG are not considered as principal threat wastes.

[END OF SECTION]

## **12 SELECTED REMEDIES**

### **12.1 Site 1 - Building 185 Incinerator**

There is no RA required for Site 1 because the site already meets USEPA Region 9 residential PRGs for the COC defined in the risk assessment (i.e., manganese), and the site is intended for industrial use. Therefore, institutional controls, i.e., deed restrictions, will be implemented to prevent residential use. The Army, IDEM, and USEPA concur with this conclusion. A LUC Soils RD/RA Work Plan will be prepared addressing this LUC and a 5-Year Review will be performed as long as contamination exists that prevents unrestricted access or reuse of the site. The cost for this review, in combination with Sites 2/27 is reflected in Table 12-10.

### **12.2 Sites 2/27 - Sewage Treatment Plant Area**

There is no human health risk or concern for these sites under the future industrial land use scenario that would warrant remediation. Therefore, deed restrictions will be placed on the property to prohibit other land uses. The Army, IDEM, and USEPA concur with this conclusion. A LUC Soils RD/RA Work Plan will be prepared addressing this LUC and a 5-Year Review will be performed as long as contamination exists that prevents the unrestricted access of the site. The cost for this review, in combination with Site 1 is reflected in Table 12-10.

### **12.3 Sites 3 - Explosive Burning Area, and 4 - Abandoned Landfill and The New Burn Site**

According to the screening performed in Tables 10-1 through 10-2 for each alternative proposed for the remediation at Sites 3/4, Alternative 2 – Limited Action (Institutional Controls and Monitoring) is the recommended RA for contaminated groundwater at Sites 3/4 and New Burn Site. And Alternative 3 – Excavation and Disposal is the recommended RA for contaminated soils in the landfill trench and the New Burn Site. This Soils RA would allow free access to the property and would have no long-term presence requirement associated with soils. The Army, IDEM, and USEPA concur that these are the preferred alternatives for Sites 3/4.

#### **12.3.1 Summary of the Rational for the Selected Remedy**

Table 10-1 and Table 10-2 provide the comparative analysis of remedial alternatives for soils and groundwater at Sites 3/4 based on the nine evaluation criteria listed in Section 10. Relative rankings of the remedial alternatives were made using a scale of 1 to 10, with 10 representing the most favorable alternative for the criteria being evaluated. Ranking was made for each evaluation criteria and the total number represented the overall performance of the alternative.

Table 10-1 shows that, for contaminated soils, Alternative 3- Excavation and Disposal has the highest ranking for the following evaluation criteria: Overall Protection, Compliance with ARARs, Long-Term Effectiveness and Reduction of Toxicity, Mobility, or Volume. The total number for Alternative 3 is 48. In contrast, the total number for Alternative 1 and Alternative 2 are 34 and 37, respectively. Therefore, Alternative 3 – Excavation and Disposal is the recommended RA for contaminated soils.

Table 10-2 compares the remedial alternatives for groundwater contaminants. Alternative 2 – Limited Action (Institutional Controls and Monitoring) has the higher or same ranking as Alternative 1 – No

Action for all the evaluation criteria except for cost. The total number for Alternative 2 is 50, while the total number for Alternative 1 is 38. Therefore, Alternative 2 – Limited Action (Institutional Controls and Monitoring) is the recommended RA for contaminated groundwater at Sites 3/4 and New Burn Site.

### **12.3.2 Detailed Description of the Selected Remedy**

The selected remedy (Alternative 3- Excavation and Off-site Disposal) for soil contamination assumes excavation of the trench soils and the soils at the New Burn Site with confirmation testing to assure that USEPA Region 9 residential PRGs are met. Confirmation sampling will be performed to assess when the RA is complete. Confirmation soil sample results will be averaged. The average will be compared to USEPA Region 9 residential PRGs to assess if remedial action objectives are met. If the average is less than USEPA Region 9 residential PRGs, AND all individual confirmation sample results are less than 5 times the USEPA Region 9 residential PRGs, then the cleanup goals will be considered to be met. If the average is greater than the USEPA Region 9 residential PRGs, OR a single confirmation sample result is greater than 5 times the USEPA Region 9 residential PRGs, then additional remediation will be required. The details of how confirmation sampling will be performed and how the results will be interpreted will be described in the Soils RD/RA Work Plan. The soils would be transported for disposal at a licensed landfill following characterization testing. This alternative would meet human health and environmental RAOs for possible future residents, thus would be protective of human health and the environment over the long term for unrestricted use. This alternative would meet applicable ARARs. There would be no reduction in toxicity or volume of the soils themselves but the toxicity and volume of contaminated soils at JPG would be reduced with this alternative. Mobility would be reduced by disposal in a properly constructed licensed landfill. For short-term effectiveness, health concerns associated with the implementation of this alternative include construction hazards associated with excavation, transport, and disposal. These operations involve conventional equipment. Personnel could readily be protected against any potential hazards. Minimal disruption of wildlife would be expected. There would be no implementability concerns associated with this alternative. Although a determination has been made that the probability of encountering munitions and explosives of concern is low, on-site construction support will be provided to minimize the duration of temporary work stoppages caused by intermittent discoveries of suspect (but likely inert) items during soil removal. This support, which is considered prudent given the history of JPG, will consist of one or both of the following: a subsurface instrument aided removal before soil removal resumes; or, the positioning of a UXO-qualified person “on standby” at the site during soil removal, to watch out for and assess any suspect items unearthed.

The selected remedy (Alternative 2 - Limited Action (Institutional Controls and Monitoring)) for groundwater contaminants does not involve active remediation; groundwater would be left in place. However, this alternative would limit the potential for human and fauna exposure to site contaminants by placing restrictions preventing usage of this water from existing or future wells. Groundwater monitoring would be performed to assess the progress of intrinsic biodegradation of VOCs in groundwater. Additional monitoring would be added for chromium, if it is chromium VI. The long-term monitoring program would be identified in the RA workplans and would have regulatory concurrence. By placing permanent restrictions on water usage through well permitting regulations and by land use deed restrictions, this alternative would protect future residents from health risks due to ingestion or contact with on-site well water regardless of disposition of soil contamination. Drinking water MCLs would be met by this alternative. There would be no reduction of toxicity, mobility, or volume of water contaminants through treatment under this alternative. There would be no short-term concerns since no construction is involved with this alternative. Implementability should not be a concern since institutional controls involve simple activities such as utilization of existing Indiana well permitting regulation and water quality monitoring.

### **12.3.3 Cost Estimate for the Selected Remedy**

Table 12-1 summarizes the present worth cost estimate for the selected remedy -Soil Excavation and Off-site Disposal for soil contaminants at Sites 3/4 and the New Burn Area. The Present Net Worth is \$1,861,000. It includes costs for documentation; site preparation; soil excavation, transportation, and disposal; confirmation sampling and testing; and stockpiling, backfilling, seeding/mulch/fertilizer. The unit costs were based on previous soil removal activities at JPG.

Table 12-2 summarizes the present worth cost estimate for the selected remedy - Limited Action (Institutional Controls and Monitoring) for groundwater contaminants at Sites 3/4. The Present Net Worth is \$880,000. It includes capital costs (well installation, planning documents, etc.), annual operation and maintenance (O&M) costs and periodic costs. The annual O&M cost was determined over a 30-year period. It includes costs for groundwater sampling and analysis, reporting and database update. The total cost is \$2,056,000 at 30 years of groundwater monitoring.

The information in Tables 12-1 and 12-2 is based on the best available information regarding the anticipated scope of the remedial alternative. Changes in the cost elements may occur as a result of new information and data collected during the engineering design of the remedial alternative. Major changes will be documented in the form of a memorandum in the Administrative Record file, or an Explanation of Significant Difference (ESD). This is an order-of-magnitude engineering cost estimate that is expected to be within +50 to -30 percent of the actual project cost. Refer to Table 12-10 for a summary of all costs associated with the RA for JPG.

### **12.3.4 Expected Outcome of Selected Remedy**

The expected outcomes of the selected remedy for this site in terms of resulting land and groundwater uses, and risk reduction achieved as a result of the remedial actions include:

- Available use of land: Upon achieving cleanup levels for lead, barium and cadmium in soil at Site 4 Trench Area, and for benzo(a)pyrene, 2,3,7,8-TCDD and zinc in soil at the New Burn Site, site will be available for unrestricted use.
- Available use of groundwater: Groundwater use will be restricted as part of the remedial action. Groundwater is not currently used at the site and is not expected to be used in future.
- The cleanup levels for contaminants in soil are based on USEPA Region 9 residential soil PRGs and soil background concentrations, whichever is higher. USEPA Region 9 residential PRGs for these soil contaminants are: lead (400 mg/kg); barium (5,400 mg/kg), cadmium (37 mg/kg); benzo(a)pyrene ( 0.062 mg/kg); 2,3,7,8-TCDD ( $3.9 \times 10^{-6}$  mg/kg) and zinc (23,000 mg/kg).
- The cleanup levels for contaminants in groundwater are based on MCLs from USEPA National Primary Drinking Water Standard.
  - Chromium (VI) does not have a listed MCL; however, chromium (VI) will be compared to the MCL of total chromium (100 µg/L), which is more stringent than the USEPA Region 9 Tap Water PRGs for chromium III (55,000 µg/L) and chromium VI (110 µg/L).
  - The MCL for trichloroethylene in groundwater is 5 µg/L.
- Anticipated socio-economic and community revitalization impacts are expected to be positive once the property for this site is transferred.

- Anticipated environmental and ecological benefits will be enhanced upon completion of the remedial action. Based on the BIRA ecological data, there are few adverse ecological effects at Sites 3/4 under current conditions. Therefore, the remedial action is expected to improve these few adverse ecological effects.

## **12.4 Sites 7/21B - Red Lead Disposal Area and Temporary Storage Area**

Alternative 2-Limited Action (Institutional Controls with Monitoring) is the recommended RA for the contaminated groundwater at Sites 7/21B based on the screening performed in Table 10-3. Institutional Controls would include a groundwater use restriction for the saturated subsurface materials above the Osgood Shale. The groundwater use restriction would limit the potential exposure pathway of ingestion of arsenic in groundwater. Monitoring of groundwater will provide information about the nature and occurrence of the arsenic in groundwater. The Army, IDEM, and USEPA concur that this is the preferred alternative for Sites 7/21B.

A Groundwater Remedial Design/Remedial Action (RD/RA) Work Plan will be prepared that summarizes the groundwater monitoring protocol. The RD/RA Work Plan will discuss how the groundwater monitoring results for arsenic will be evaluated to assess if arsenic is naturally occurring and the steps and documentation necessary to determine whether monitoring can be terminated.

### **12.4.1 Summary of the Rational for the Selected Remedy**

Table 10-3 provides the comparative analysis of remedial alternatives for groundwater at Sites 7/21B based on the nine evaluation criteria listed in Section 10. Relative rankings of the remedial alternatives were made using a scale of 1 to 10, with 10 representing the most favorable alternative for the criteria being evaluated. Ranking was made for each evaluation criteria and the total number represented the overall performance of the alternative. Alternative 2 – Limited Action (Institutional Controls and Monitoring) has the highest ranking resulting from totaling the rank for each of the following evaluation criteria: Overall Protection, Long-Term Effectiveness, Short-Term Effectiveness, Implementability and Present Worth Cost. The total number for Alternative 2 is 48. In contrast, the total number for Alternative 1 and Alternative 3 are 38 and 42, respectively. Therefore, Alternative 2 – Limited Action (Institutional Controls and Monitoring) is the recommended RA for contaminated groundwater at Sites 7/21B.

### **12.4.2 Detailed Description of the Selected Remedy**

The selected remedy (Alternative 2 - Limited Action (Institutional Controls and Monitoring)) for groundwater contaminants would not involve active remediation; site water would be left in place. However, this alternative would limit the potential for human and fauna exposure to site contaminants by restricting groundwater usage. Deed and/or land use restrictions would be developed for future protection if the property were released to the public. This alternative would include land use restrictions to prevent future usage of the contaminated groundwater. Groundwater monitoring would include periodic groundwater sampling to evaluate groundwater chemistry and natural dilution and dispersion. This alternative would meet the RAO under current and future conditions by restricting usage of the groundwater. Drinking water MCLs would not likely be met by this alternative, although exposure is limited. However, the occurrence of arsenic may be determined through monitoring to be naturally occurring, in which case there is no statutory requirement to remediate the groundwater for arsenic. For the long-term effectiveness and permanence, this alternative would be protective of human health and the environment over the long term as long as institutional controls remained in place. Groundwater monitoring would be required to monitor contaminant levels over time to evaluate the nature of the

groundwater chemistry. Five-year reviews would be conducted as long as contamination exists that prevents unrestricted access or reuse to evaluate the effectiveness of the institutional controls in protecting human health and the environment. There would be no reduction of toxicity, mobility, or volume of water contaminants through treatment under this alternative. In addition, there would be no short-term hazards or implementability concerns associated with this alternative.

#### **12.4.3 Cost Estimate for the Selected Remedy**

Table 12-3 summarizes the present worth cost estimate for the selected remedy - Limited Action (Institutional Controls and Monitoring) for groundwater contaminants at Sites 7/21B. The Present Net Worth is \$383,000. It includes capital costs (planning documents and support, etc.), annual O&M costs and periodic costs. The annual O&M cost was determined over a 20-year period. It includes groundwater sampling and analysis, reporting and database update. The total cost is \$710,000 at 20 years of groundwater monitoring.

The information in Table 12-3 is based on the best available information regarding the anticipated scope of the remedial alternative. Changes in the cost elements may occur as a result of new information and data collected during the engineering design of the remedial alternative. Major changes will be documented in the form of a memorandum in the Administrative Record file, or an ESD. This is an order-of-magnitude engineering cost estimate that is expected to be within +50 to -30 percent of the actual project cost. Refer to Table 12-10 for a summary of all costs associated with the RA for JPG.

#### **12.4.4 Expected Outcome of Selected Remedy**

The expected outcomes of the selected remedy for this site in terms of resulting land and groundwater uses, and risk reduction achieved as a result of the remedial actions include:

- Available use of land: Site is available for industrial use. Based on confirmation sample testing, soils do not pose a health risk.
- Available uses of groundwater: Groundwater use will be restricted as part of the remedial action. Groundwater is not currently used and is not expected to be used in the future.
- The cleanup level for arsenic in groundwater is 10 µg/L, which is the arsenic MCL from USEPA National Primary Drinking Water Standard.
- Anticipated socio-economic and community revitalization impacts are expected to be positive once the property for this site is transferred.
- Anticipated environmental and ecological benefits will be enhanced upon completion of the remedial action even though the sites are intended for industrial use.

### **12.5 Sites 9/10 - Gate 19 Landfill and Burning Ground South of Gate 19 Landfill**

Sites 9 and 10 are located north of the Firing Line, and will not be transferred out of Army ownership. The planned future land use for these two sites is incorporation into the current refuge system. Based on this intended wildlife refuge land use, there are no exposure pathways that would pose a human health or ecological concern. Sites 9 and 10 are recommended for NFA, Restricted Use. Access to Sites 9/10 is limited by the perimeter and east-west firing line fence (8- ft high chain link topped with 3-strand v-shaped barbed wire) currently in place at JPG. In addition to the fences, access to the area is controlled

by the USFWS by a locked gate with restricted access to the key and as specified by the MOA between the Army, USFWS, and the Air Force for access control. Additional controls will be implemented to prevent the cap from being damaged. These additional controls will be described in a Soils RD/RA Work Plan. The Army, IDEM, and USEPA concur with this conclusion.

## **12.6 Site 12A - Building 602 Solvent Pit**

Alternative 2-Limited Action (Institutional Controls with Monitoring) is the recommended RA for the contaminated groundwater at Site 12A based on the screening performed in Table 10-4. Institutional Controls would include a groundwater use restriction for the saturated subsurface materials above the Waldron Shale. The groundwater use restriction would limit the potential exposure pathway of ingestion of VOCs in groundwater. Monitoring of groundwater will provide information to evaluate intrinsic biodegradation and the potential for plume movement. The Army, IDEM, and USEPA concur with this alternative.

A Groundwater RD/RA Work Plan will be prepared that summarizes the groundwater monitoring protocol. The Groundwater RD/RA Work Plan will discuss how the groundwater monitoring results will be evaluated to assess the effects of natural attenuation. It is anticipated that the frequency of groundwater monitoring will be reduced over time based on natural attenuation results. The methodology for addressing when monitoring can be terminated will be addressed in the Groundwater RD/RA Work Plan.

### **12.6.1 Summary of the Rational for the Selected Remedy**

Table 10-4 provides the comparative analysis of remedial alternatives for groundwater at Site 12A based on the nine evaluation criteria listed in Section 10. Relative rankings of the remedial alternatives were made using a scale of 1 to 10, with 10 representing the most favorable alternative for the criteria being evaluated. Ranking was made for each evaluation criteria and the total number represented the overall performance of the alternative. Alternative 2 – Limited Action (Institutional Controls and Monitoring) has the highest ranking resulting from totaling the rank for the following evaluation criteria: Overall Protection, Long-Term Effectiveness, Short-Term Effectiveness, Implementability and Present Worth Cost. The total number for Alternative 2 is 57. In contrast, the total number for Alternative 1 and Alternative 3 are 45 and 50, respectively. Therefore, Alternative 2 – Limited Action (Institutional Controls and Monitoring) is the recommended RA for contaminated groundwater at Site 12A.

### **12.6.2 Detailed Description of the Selected Remedy**

The selected remedy (Alternative 2 - Limited Action (Institutional Controls and Monitoring)) for groundwater would not involve active remediation; site water would be left in place. However, this alternative would limit the potential for human and fauna exposure to site contaminants by restricting groundwater use. These controls would include well drilling restrictions and monitoring. Deed and/or land use restrictions would be developed for future protection if the property were released to the public. This alternative would include monitoring of contaminant concentrations to evaluate intrinsic biodegradation and the potential for plume movement.

For the overall protection of human health and the environment, this option would limit risk to human health and the environment until monitoring determined that groundwater VOC contamination was reduced below ARARs. Exposure to water with contaminant levels exceeding MCLs would be minimized and perhaps eventually eliminated by this alternative. For the long-term effectiveness and permanence, human health remediation objectives could be met for future receptors by using well drilling regulatory restrictions and deed restrictions to restrict usage of the groundwater. Intrinsic biodegradation

could eventually remove the hazardous chemicals so that risk to human health and the environment would be within acceptable levels. There would be no reduction of the toxicity, mobility, or volume of water contaminants through treatment under this alternative. And there would be no short-term concerns for this alternative. Implementability should not be a concern since it involves simple activities such as utilization of existing Indiana well permitting regulations and water quality monitoring. Obtaining deed restrictions for future use would be a straight forward, well-proven process. This alternative would, therefore, be readily implementable.

### **12.6.3 Cost Estimate for the Selected Remedy**

Table 12-4 summarizes the present worth cost estimate for the selected remedy - Limited Action (Institutional Controls and Monitoring) for groundwater contaminants at Site 12A. The Present Net Worth is \$688,000. It includes capital costs (planning documents and support, etc.), annual O&M costs and periodic costs. The annual O&M cost was determined over a 30-year period. It includes groundwater sampling, laboratory analysis, reporting and database update. The total cost is \$1,640,000 over a period of 30 years of groundwater monitoring.

The information in Table 12-4 is based on the best available information regarding the anticipated scope of the remedial alternative. Changes in the cost elements may occur as a result of new information and data collected during the engineering design of the remedial alternative. Major changes will be documented in the form of a memorandum in the Administrative Record file, or an ESD. This is an order-of-magnitude engineering cost estimate that is expected to be within +50 to -30 percent of the actual project cost. Refer to Table 12-10 for a summary of all costs associated with the RA for JPG.

### **12.6.4 Expected Outcome of Selected Remedy**

The expected outcomes of the selected remedy for this site in terms of resulting land and groundwater uses, and risk reduction achieved as a result of the remedial actions include:

- Available land uses of Site 12A: Soils at Site 12A do not pose health risks under the intended industrial land use scenario.
- Available uses of groundwater: Groundwater use is restricted as part of the remedial action. Groundwater is not currently used and is not expected to be used in the future.
- The cleanup level for 1,1,1-trichloroethane in groundwater is 200 µg/L, which is the MCL from USEPA National Primary Drinking Water Standards.
- Anticipated socio-economic and community revitalization impacts are expected to be positive once the property for this site is transferred.
- Anticipated environmental and ecological benefits will be enhanced upon completion of the remedial action.

## **12.7 Site 12B - Building 617 Solvent Pit**

Alternative 2-Limited Action (Institutional Controls with Monitoring) is the recommended RA for the contaminated groundwater at Site 12B based on the screening performed in Table 10-5. Institutional Controls would include a groundwater use restriction for the saturated subsurface materials above the Waldron Shale. The groundwater use restriction would limit the potential exposure pathway of ingestion of VOCs in groundwater. Monitoring of groundwater would provide information to evaluate intrinsic

biodegradation and the potential for plume movement. The Army, IDEM, and USEPA concur with this alternative.

A Groundwater RD/RA Work Plan will be prepared that summarizes the groundwater monitoring protocol. The Groundwater RD/RA Work Plan will discuss how the groundwater monitoring results will be evaluated to assess the effects of natural attenuation. It is anticipated that the frequency of groundwater monitoring will be reduced over time based on natural attenuation results. The steps and documentation necessary to determine whether groundwater monitoring can be terminated will be addressed in the Groundwater RD/RA Work Plan.

### **12.7.1 Summary of the Rational for the Selected Remedy**

Table 10-5 provides the comparative analysis of remedial alternatives for groundwater at Site 12B based on the nine evaluation criteria listed in Section 10. Relative rankings of the remedial alternatives were made using a scale of 1 to 10, with 10 representing the most favorable alternative for the criteria being evaluated. Ranking was made for each evaluation criteria and the total number represented the overall performance of the alternative. Alternative 2 – Limited Action (Institutional Controls and Monitoring) has the highest ranking as a result of totaling the rank for the following evaluation criteria: Overall Protection, Long-Term Effectiveness, Short-Term Effectiveness, Implementability and Present Worth Cost. The total number for Alternative 2 is 57. In contrast, the total number for Alternative 1 and Alternative 3 are 45 and 50, respectively. Therefore, Alternative 2 – Limited Action (Institutional Controls and Monitoring) is the recommended RA for contaminated groundwater at Site 12B.

### **12.7.2 Detailed Description of the Selected Remedy**

The selected remedy (Alternative 2 - Limited Action (Institutional Controls and Monitoring)) for groundwater would not involve active remediation; site water would be left in place. However, this alternative would limit the potential for human and fauna exposure to site contaminants by restricting groundwater use. These controls would include well drilling restrictions and monitoring. Deed and/or land use restrictions would be developed for future protection if the property were released to the public. This alternative would include monitoring of contaminant concentrations to evaluate intrinsic biodegradation and the potential for plume movement.

For the overall protection of human health and the environment, this option would limit risk to human health and the environment until monitoring determined that groundwater VOC contamination was reduced below ARARs. Exposure to water with contaminant levels exceeding MCLs would be minimized and perhaps eventually eliminated by this alternative. For the long-term effectiveness and permanence, human health remediation objectives could be met for future receptors by using well drilling regulatory restrictions and deed restrictions to restrict usage of the groundwater. Intrinsic biodegradation could eventually remove the hazardous chemicals so that risk to human health and the environment would be within acceptable levels. There would be no reduction of the toxicity, mobility, or volume of water contaminants through treatment under this alternative. And there would be no short-term concerns for this alternative. Implementability should not be a concern since it involves simple activities such as utilization of existing Indiana well permitting regulations and water quality monitoring. Obtaining deed restrictions for future use would be a straight forward, well-proven process. This alternative would be, therefore, readily implementable.

### **12.7.3 Cost Estimate for the Selected Remedy**

Table 12-5 summaries the present worth cost estimate for the selected remedy - Limited Action (Institutional Controls and Monitoring) for groundwater contaminants at Site 12B. The Present Net Worth is \$798,000. It includes capital costs (well replacement, planning documentations, etc), annual O&M costs and periodic costs. The annual O&M cost was determined over a 30-year period. It includes

groundwater sampling, laboratory analysis, reporting and database update. The total cost is \$1,791,000 over a period of 30 years of groundwater monitoring.

The information in Table 12-5 is based on the best available information regarding the anticipated scope of the remedial alternative. Changes in the cost elements may occur as a result of new information and data collected during the engineering design of the remedial alternative. Major changes will be documented in the form of a memorandum in the Administrative Record file, or an ESD. This is an order-of-magnitude engineering cost estimate that is expected to be within +50 to –30 percent of the actual project cost. Refer to Table 12-10 for a summary of all costs associated with the RA for JPG.

#### **12.7.4 Expected Outcome of Selected Remedy**

The expected outcomes of the selected remedy for this site in terms of resulting land and groundwater uses, and risk reduction achieved as a result of the remedial actions include:

- Available land uses of Site 12B: Soils at Site 12B do not pose health risks under the intended industrial land use scenario.
- Available uses of groundwater: Groundwater use is restricted as part of the remedial action. Groundwater is not currently used and is not to expected to be used in the future.
- The cleanup levels for contaminants in groundwater are based on MCLs from USEPA National Primary Drinking Water Standards. The listed USEPA MCLs for 1,1-dichloroethylene, 1,1,1-trichloroethane and 1,2-dichloroethane are 7 µg/L, 200 µg/L, and 5 µg/L, respectively.
- Anticipated socio-economic and community revitalization impacts are expected to be positive once the property for this site is transferred.
- Anticipated environmental and ecological benefits will be enhanced upon completion of the remedial action.

### **12.8 Site 12C - Building 279 Solvent Pit**

Alternative 2 – Limited Action (Institutional Controls and Monitoring) is the recommended RA for contaminated groundwater at Site 12C based on the screening performed in Table 10-6. Institutional Controls would include a groundwater use restriction for the saturated subsurface materials above the Waldron Shale. The groundwater use restriction would limit the potential exposure pathway of ingestion of VOCs in groundwater. Monitoring of groundwater would provide information to evaluate intrinsic biodegradation and the potential for plume movement. It is likely that intrinsic biodegradation would occur within the monitoring period. Therefore, when monitoring shows that MCLs are met, monitoring would be discontinued and deed restrictions would be lifted. The Army, IDEM, and USEPA concur with this alternative.

A Groundwater RD/RA Work Plan will be prepared that summarizes the groundwater monitoring protocol. The Groundwater RD/RA Work Plan will discuss how the groundwater monitoring results will be evaluated to assess the effects of natural attenuation. It is anticipated that the frequency of groundwater monitoring will be reduced over time based on natural attenuation results. The steps and documentation necessary to determine whether groundwater monitoring can be terminated will be addressed in the Groundwater RD/RA Work Plan.

### **12.8.1 Summary of the Rational for the Selected Remedy**

Table 10-6 provides the comparative analysis of remedial alternatives for groundwater at Site 12C based on the nine evaluation criteria listed in Section 10. Relative rankings of the remedial alternatives were made using a scale of 1 to 10, with 10 representing the most favorable alternative for the criteria being evaluated. Ranking was made for each evaluation criteria and the total number represented the overall performance of the alternative. Alternative 2 – Limited Action (Institutional Controls and Monitoring) has the highest ranking as a result of totaling the rank for the following evaluation criteria: Overall Protection, Long-Term Effectiveness, Short-Term Effectiveness, Implementability and Present Worth Cost. The total number for Alternative 2 is 57. In contrast, the total number for Alternative 1 and Alternative 3 are 45 and 54, respectively. Therefore, Alternative 2 – Limited Action (Institutional Controls and Monitoring) is the recommended RA for contaminated groundwater at Site 12C.

### **12.8.2 Detailed Description of the Selected Remedy**

The selected remedy (Alternative 2 - Limited Action (Institutional Controls and Monitoring)) for groundwater would not involve active remediation; site water would be left in place. However, this alternative would limit the potential for human and fauna exposure to site contaminants by restricting groundwater use. These controls would include well drilling restrictions and monitoring. Deed and/or land use restrictions would be developed for future protection if the property were released to the public.

This alternative would include monitoring of contaminant concentrations to evaluate intrinsic biodegradation and the potential for plume movement. When monitoring indicates that MCLs are met, monitoring would be discontinued and the deed restrictions would be lifted.

For the overall protection of human health and the environment, compliance with well drilling restrictions would minimize exposure to the contaminated groundwater by both humans and grazing animals. Deed restrictions would help to provide the same protection. This option would not limit risk to human health and the environment until monitoring determined that groundwater VOC contamination was reduced below ARARs. For the long-term effectiveness and permanence, human health remediation objectives could be met for future receptors by using well drilling regulatory restrictions and deed restrictions to restrict usage of the groundwater. Intrinsic biodegradation could eventually remove the hazardous chemicals so that risk to human health and the environment would be within acceptable levels. There would be no reduction of the toxicity, mobility, or volume of water contaminants through treatment under this alternative. And there would be no short-term concerns for this alternative. Implementability should not be a concern since institutional controls involves simple activities such as utilization of existing Indiana well permitting regulations and water quality monitoring. Obtaining deed restrictions for future use would be a straight forward, well-proven process. This alternative would be, therefore, readily implementable.

### **12.8.3 Cost Estimate for the Selected Remedy**

Table 12-6 summaries the present worth cost estimate for the selected remedy - Limited Action (Institutional Controls and Monitoring) for groundwater contaminants at Site 12C. The Present Net Worth is \$439,000. It includes capital costs (planning documents and support, etc), annual O&M costs and periodic costs. The annual O&M cost was determined over a 20-year period. It includes groundwater sampling, laboratory analysis, reporting and database update. The total cost is \$814,000 over a period of 20 years of groundwater monitoring.

The information in Table 12-6 is based on the best available information regarding the anticipated scope of the remedial alternative. Changes in the cost elements are likely to occur as a result of new information and data collected during the engineering design of the remedial alternative. Major changes will be documented in the form of a memorandum in the Administrative Record file, or an ESD. This is

an order-of-magnitude engineering cost estimate that is expected to be within +50 to –30 percent of the actual project cost. Refer to Table 12-10 for a summary of all costs associated with the RA for JPG.

#### **12.8.4 Expected Outcome of Selected Remedy**

The expected outcomes of the selected remedy for this site in terms of resulting land and groundwater uses, and risk reduction achieved as a result of the remedial actions include:

- Available land uses of Site 12C: Since soil remediation has already been performed at Site 12C, soils are no longer a human health risk. However, Site 12C is intended to remain part of the wildlife refuge and will not be transferred.
- Available uses of groundwater: Groundwater use is restricted as part of the remedial action. Groundwater is not currently used and will not be used in the future.
- The cleanup levels for contaminants in groundwater are based on MCLs from USEPA National Primary Drinking Water Standards. The listed USEPA MCLs for 1,1-dichloroethylene, 1,1,1-trichloroethane and trichloroethene are 7 µg/L, 200 µg/L, and 5 µg/L, respectively.
- Anticipated socio-economic and community revitalization impacts are expected to be minimal because the property will not be transferred.
- Anticipated environmental and ecological benefits were enhanced as part of the soil removal action.

### **12.9 Site 14 - Yellow Sulfur Disposal Area**

Alternative 2 – Limited Action (Institutional Controls and Monitoring) is the recommended RA for arsenic contaminated groundwater at Site 14 based on the screening performed in Table 10-7. Institutional Controls would include a groundwater use restriction for the saturated subsurface materials above the Waldron Shale. The groundwater use restriction would limit the potential exposure pathway of ingestion of arsenic in groundwater. Monitoring of groundwater would provide information about the nature and occurrence of the arsenic in groundwater. Additional excavation and disposal of contaminated soils at Site 14 to complete the previous removal action would also be performed. This may result in removal of the source of elevated metals found in groundwater at Site 14. This soils removal action would include UXO support during excavation. The Army, IDEM, and USEPA concur with this alternative.

#### **12.9.1 Summary of the Rational for the Selected Remedy**

Table 10-7 provides the comparative analysis of remedial alternatives for groundwater at Site 14 based on the nine evaluation criteria listed in Section 10. Relative rankings of the remedial alternatives were made using a scale of 1 to 10, with 10 representing the most favorable alternative for the criteria being evaluated. Ranking was made for each evaluation criteria and the total number represented the overall performance of the alternative. Alternative 2 – Limited Action (Institutional Controls and Monitoring) has the highest ranking as a result of totaling the rank for the following evaluation criteria: Overall Protection, Compliance with ARARs, Long-Term Effectiveness, Short-Term Effectiveness and Implementability. The total number for Alternative 2 is 58. In contrast, the total number for Alternative 1 and Alternative 3 are 38 and 54, respectively. Therefore, Alternative 2 – Limited Action (Institutional Controls and Monitoring) is the recommended RA for contaminated groundwater at Site 14.

### **12.9.2 Detailed Description of the Selected Remedy**

The selected remedy (Alternative 2 - Limited Action (Institutional Controls and Monitoring)) for groundwater would not involve active remediation; site water would be left in place. However, this alternative would limit the potential for human and fauna exposure to site contaminants by restricting groundwater usage. Deed and/or land use restrictions would be developed for future protection if the property were released to the public. This alternative would include land use restrictions to prevent future usage of the contaminated groundwater. Groundwater monitoring would include periodic groundwater sampling to evaluate groundwater chemistry and natural dilution and dispersion.

For the overall protection of human health and the environment, compliance with well drilling restrictions would minimize exposure to the contaminated groundwater by both humans and grazing animals. Deed restrictions would help to provide the same protection. This option would not preclude risk to human health and the environment unless monitoring demonstrated that groundwater arsenic contamination was reduced below ARARs. Exposure to water with contaminant levels exceeding MCLs would be minimized and perhaps eventually eliminated by this alternative. However, the occurrence of arsenic may be determined through monitoring to be naturally occurring, in which case there is no statutory requirement to remediate the groundwater for arsenic. For the long-term effectiveness and permanence, human health remediation objectives could be met for future receptors by using well drilling regulatory restrictions and deed restrictions to restrict access to the groundwater. Natural attenuation could eventually remove the hazardous chemicals so that risk to human health and the environment would be within acceptable levels. There would be no reduction of the toxicity, mobility, or volume of water contaminants through treatment under this alternative. And there would be no short-term concerns for this alternative. Implementability should not be a concern since institutional controls involve simple activities such as utilization of existing Indiana well permitting regulations and water quality monitoring. Obtaining deed restrictions for future use would be a straight forward, well-proven process. This alternative would be, therefore, readily implementable

Additional excavation and disposal of contaminated soils at Site 14 could result in removal of the source of elevated metals found in groundwater at Site 14. Additional removal to complete the previous removal action performed in 1996/1997 is estimated to cost approximately \$224,000 (Section 12.9.3). Confirmation sampling will be performed to assess when the RA is complete. Confirmation soil sample results will be averaged. The average will be compared to USEPA Region 9 residential PRGs to assess if remedial action objectives are met. If the average is less than USEPA Region 9 residential PRGs, AND all individual confirmation sample results are less than 5 times the USEPA Region 9 residential PRGs, then the cleanup goals will be considered to be met. If the average is greater than the USEPA Region 9 residential PRGs, OR a single confirmation sample result is greater than 5 times the USEPA Region 9 residential PRGs, then additional remediation will be required. The details of how confirmation sampling will be performed and how the results will be interpreted will be described in the Soils RD/RA Work Plan. Although a determination has been made that the probability of encountering munitions and explosives of concern is low, on-site construction support will be provided to minimize the duration of temporary work stoppages caused by intermittent discoveries of suspect (but likely inert) items during soil removal. This support, which is considered prudent given the history of JPG, will consist of one or both of the following: a subsurface instrument aided removal before soil removal resumes; or, the positioning of a UXO-qualified person "on standby" at the site during soil removal, to watch out for and assess any suspect items unearthed.

### **12.9.3 Cost Estimate for the Selected Remedy**

Table 12-7 summarizes the present worth cost estimate for the selected remedy - Limited Action (Institutional Controls and Monitoring) for groundwater contaminants at Site 14. The Present Net Worth is \$340,000. It includes capital costs (planning documents and support, etc), annual O&M costs and

periodic costs. The annual O&M cost was determined over a 20-year period. It includes groundwater sampling, laboratory analysis, reporting and database update. The total cost is \$627,000 over a period of 20 years of groundwater monitoring.

Table 12-8 summarizes the present worth cost estimate for the continued soil removal - Excavation and Offsite Disposal for soil contaminants at Site 14. The total cost is \$224,000. It includes capital costs for construction documentation; clearing and grubbing; soil excavation, transportation, and disposal; confirmation sampling and testing; and stockpiling, backfilling, seeding/mulch/fertilizer, etc. Since the contaminants would be removed to acceptable levels, there would be no long-term O&M costs associated with this alternative. The unit costs were based on previous soil removal activities at JPG.

The information in Table 12-7 and Table 12-8 is based on the best available information regarding the anticipated scope of the remedial alternative. Changes in the cost elements are likely to occur as a result of new information and data collected during the engineering design of the remedial alternative. Major changes will be documented in the form of a memorandum in the Administrative Record file, or an ESD. This is an order-of-magnitude engineering cost estimate that is expected to be within +50 to -30 percent of the actual project cost. Refer to Table 12-10 for a summary of all costs associated with the RA for JPG.

#### **12.9.4 Expected Outcome of Selected Remedy**

The expected outcomes of the selected remedy for this site in terms of resulting land and groundwater uses, and risk reduction achieved as a result of the remedial actions include:

- Available land uses of Site 14: Upon achieving cleanup level for chromium in soil will be unrestricted.
- Available uses of groundwater: Groundwater use is restricted as part of the remedial action. Groundwater is not currently used and is not expected to be used in the future.
- The cleanup level for chromium in soil is 30 mg/kg, which is the USEPA Region 9 residential PRG for chromium.
- The cleanup level for arsenic in groundwater is 10 µg/L, which is the MCL from USEPA National Primary Drinking Water Standards.
- Anticipated socio-economic and community revitalization impacts are expected to be positive once the property for this site is transferred.
- Anticipated environmental and ecological benefits will be enhanced upon completion of the remedial action.

### **12.10 Sites 21A/30 - Building 204 Temporary Storage Area**

Alternative 3 – Excavate/Dispose is the recommended RA for pesticide-contaminated soils at Sites 21A/30 based on the screening performed in Table 10-8. This RA would allow free access to the property and would require no long-term presence. The Army, IDEM, and USEPA concur with this alternative.

### **12.10.1 Summary of the Rational for the Selected Remedy**

Table 10-8 provides the comparative analysis of remedial alternatives for soils at Sites 21A/30 based on the nine evaluation criteria listed in Section 10. Relative rankings of the remedial alternatives were made using a scale of 1 to 10, with 10 representing the most favorable alternative for the criteria being evaluated. Ranking was made for each evaluation criteria and the total number represented the overall performance of the alternative. Alternative 3 – Excavation and off-site Disposal has the highest ranking as a result of totaling the rank for the following evaluation criteria: Overall Protection, Compliance with ARARs, Long-Term Effectiveness, Reduction of Toxicity, Mobility, or Volume, and Implementability. The total number for Alternative 3 is 51. In contrast, the total number for Alternative 1 and Alternative 2 are 34 and 41, respectively. Therefore, Alternative 3 – Excavation and off-site Disposal is the recommended RA for contaminated soils at Sites 21A/30.

### **12.10.2 Detailed Description of the Selected Remedy**

The selected remedy (Alternative 3 - Excavation and Off-Site Disposal) for soil contaminants at Sites 21A/30 involves the removal of contaminated soil exceeding the USEPA Region 9 residential PRGs established for dieldrin. The use of standard lightweight excavation equipment could be utilized because of the relatively shallow and small area of contaminated soil. Confirmation samples would then be collected to verify that any residual contamination is below the USEPA Region 9 residential PRG. Confirmation sampling will be performed to assess when the RA is complete. Confirmation soil sample results will be averaged. The average will be compared to USEPA Region 9 residential PRGs to assess if remedial action objectives are met. If the average is less than USEPA Region 9 residential PRGs, AND all individual confirmation sample results are less than 5 times the USEPA Region 9 residential PRGs, then the cleanup goals will be considered to be met. If the average is greater than the USEPA Region 9 residential PRGs, OR a single confirmation sample result is greater than 5 times the USEPA Region 9 residential PRGs, then additional remediation will be required. The details of how confirmation sampling will be performed and how the results will be interpreted will be described in the Soils RD/RA Work Plan. Clean soil from an on-site borrow area would be used to backfill the excavation after the confirmation sample results are reviewed and approved. Removal and proper disposal of contaminated soils exceeding USEPA Region 9 residential PRGs would effectively reduce risk to human health and the environment due to both current and future potential exposure. The USEPA Region 9 residential PRGs would be met under this alternative.

This alternative would meet applicable action-and location-specific ARARs. Removal of contaminated soil and backfilling with clean soil would provide both long-term effectiveness and permanence by removing the potential source of risks to human health and the environment. The long-term effectiveness is dependent on proper off-site disposal. The disposal facility would be required to ensure long-term effectiveness and permanence through long-term monitoring and maintenance. There would be no reduction in toxicity or volume of the soils themselves, however the toxicity and volume of contaminated soils at JPG will be reduced with this alternative. Mobility would be reduced by disposal in a properly constructed and maintained landfill. Short-term risks to the public, workers, and the environment during the excavation and disposal activities would be expected to be low. There could be some short-term exposure due to the creation of fugitive dust during removal activities. Engineering controls, such as dust suppression during excavation and hauling could significantly reduce any risks due to fugitive dust. In addition, construction workers would be required to wear proper personal protective equipment during construction activities. About implementability, excavation and off-site disposal involves standard excavation technologies, which are readily implemented. Equipment and materials for implementation of this alternative would be readily available. It is assumed that a landfill is located within 100 miles of Site 21A. Although a determination has been made that the probability of encountering munitions and explosives of concern is low, on-site construction support will be provided to minimize the duration of temporary work stoppages caused by intermittent discoveries of suspect (but likely inert) items during

soil removal. This support, which is considered prudent given the history of JPG, will consist of one or both of the following: a subsurface instrument aided removal before soil removal resumes; or, the positioning of a UXO-qualified person “on standby” at the site during soil removal, to watch out for and assess any suspect items unearthed.

### **12.10.3 Cost Estimate for the Selected Remedy**

The cost for excavation, hauling, disposal, and backfilling of contaminated soils at Sites 21A/30 is approximately \$117,000 (Table 12-9). It includes capital costs for construction documentation; clearing and grubbing; soil excavation, transportation, and disposal; confirmation sampling and testing; and stockpiling, backfilling, seeding/mulch/fertilizer, etc. The unit costs are based on previous soil removal activities at JPG. The estimated volume is 20 cubic yards (30 tons). Since the contaminants would be removed to acceptable levels, there would be no long-term O&M costs associated with this alternative.

The information in Table 12-9 is based on the best available information regarding the anticipated scope of the remedial alternative. Changes in the cost elements may occur as a result of new information and data collected during the engineering design of the remedial alternative. Major changes would be documented in the form of a memorandum in the Administrative Record file, or an ESD. This is an order-of-magnitude engineering cost estimate that is expected to be within +50 to –30 percent of the actual project cost. Refer to Table 12-10 for a summary of all costs associated with the RA for JPG.

### **12.10.4 Expected Outcome of Selected Remedy**

The expected outcomes of the selected remedy for this site in terms of resulting land and groundwater uses, and risk reduction achieved as a result of the remedial actions include:

- Available land uses: Upon achieving cleanup level for dieldrin in soil, available use is unrestricted.
- Available groundwater use: Groundwater use is not restricted.
- The cleanup level for dieldrin in soil is based on USEPA Region 9 residential soil PRG and soil background concentration, whichever is higher. The USEPA Region 9 residential soil PRG is 0.03 mg/kg for dieldrin.
- Anticipated socio-economic and community revitalization impacts are expected to be positive once the property for this site is transferred.
- Anticipated environmental and ecological benefits will be enhanced upon completion of the remedial action.

[END OF SECTION]

## **13 STATUTORY DETERMINATIONS**

The purpose of this section is to provide a brief, site-specific description of how the proposed remedies satisfy the statutory requirements of CERCLA §121 (as required by NCP §300.4300(f)(5)(ii)) and explain the 5-year review requirements for the proposed remedies.

### **13.1 Protection of Human Health and the Environment**

The proposed remedy (Excavation and Off-Site Disposal) for soil contamination at Sites 3/4 and Sites 21A/30 will excavate the contaminated soil from the sites, followed by confirmation testing of residual soils to assure soil meets the USEPA Region 9 residential PRGs. In addition, additional soil excavation and off-site disposal will occur at Site 14 to complete the previous removal action activities. The removed soil will be transported for disposal at a licensed landfill. The proposed remedy for soil contamination will meet human health and environmental RAOs for possible future residents, thus would be protective of human health and the environment over the long term for unrestricted use. The proposed remedy will reduce the carcinogenic risks to fall within the USEPA's acceptable risk range of  $10^{-4}$  to  $10^{-6}$ ; in addition, the Hazard Index for non-carcinogens will be reduced to less than one. There are no short-term threats associated with this remedy, and there are no adverse cross-media impacts.

The proposed soils remedy for Sites 1, and 2/27 is Institutional Controls, i.e., Deed Restriction. This remedy by itself will not include active remedial actions; soils would be left in place. However, this alternative would limit the potential for human exposure to site contaminants by placing restrictions preventing residential use. No unacceptable short-term risk will be caused by implementation of this remedy. A LUC Soils RD/RA Work Plan will be prepared for Sites 1 and 2/27 and will be submitted to the regulatory agencies for review. This document will detail the implementation and maintenance of the LUC. Sites 9/10 are controlled by the May 2000 MOA between the Army, USFWS, and the Air Force.

The proposed remedy for groundwater contamination is Limited Action (Institutional Controls and Monitoring). This remedy by itself will not include active remedial actions; groundwater would be left in place. However, this alternative would limit the potential for human and fauna exposure to site contaminants by placing restrictions preventing the usage of water from existing or future wells. By placing permanent restrictions on water usage, this remedy would protect future occupants from health risks due to ingestion or contact with on-site well water. No unacceptable short-term risk or cross-media adverse impacts will be caused by implementation of the selected groundwater remedy.

Some of the soils and groundwater proposed remedies in this ROD rely on institutional controls as a land use control to protect human health and the environment. In October 2003, the USEPA and the Department of Navy established "Principles and Procedures for Specifying, Monitoring and Enforcement of Land Use Controls and Other Post-ROD Actions" to better implement CERCLA responsibilities. According to the Principles, with regard to Land Use Control (LUC) a Record of Decision shall:

1. Describe the risk(s) necessitating the remedy including LUCs: The risk associated with each site is summarized in Table 7-1 and discussed in Section 12.
2. Document risk exposure assumptions and reasonably anticipated land uses: Refer to Section 7 for risk exposure assumptions and to Section 6 for land use.

3. Generally describe the LUC, the logic for its selection and any related deed restrictions/notification: Refer to the following table:

LUC Site	Media	Refer to the Following Section		
		Generally Describe LUC	Logic for Selection	Any Related Deed Restrictions/Notifications
Site 1	Soil	9.1	12.1	12.1
Sites 2/27	Soil	9.2	12.2	12.2
Sites 3/4	Groundwater	9.3	12.3.1	12.3.2 and 12.3.4
Sites 7/21B	Groundwater	9.4	12.4.1	12.4.2 and 12.4.4
Sites 9/10	Soil	9.5	12.5	12.5
Site 12A	Groundwater	9.6	12.6.1	12.6.2 and 12.6.4
Site 12B	Groundwater	9.7	12.7.1	12.7.2 and 12.7.4
Site 12C	Groundwater	9.8	12.8.1	12.8.2 and 12.8.4
Site 14	Groundwater	9.9	12.9.1	12.9.2 and 12.9.4

4. State the LUC performance objectives: Section 8 and Table 8-1 address this information.
5. List the parties responsible for implementing, monitoring, reporting on, and enforcement of the LUCs: The Army is initially responsible for implementation as discussed in the Groundwater RD/RA Work Plan and the LUC Soils RD/RA Work Plan. Once a parcel of property is transferred, the new property owner will be responsible for LUCs.
6. Provide a description of the area/property covered by the LUCs (should include a map): Refer to Section 5 for site descriptions and to Figure 2 for general location map. A more detailed location map will be included in the Groundwater RD/RA Work Plan and/or the LUC Soils RD/RA Work Plan.
7. Provide the expected duration of the LUCs: It is expected that groundwater and soil land use controls will be maintained until the concentrations of constituents in groundwater and soil at the Site are reduced to levels that allow for unlimited exposure and unrestricted use: This will be further described in the Groundwater RD/RA Work Plan and LUC Soils RD/RA Work Plan.
8. Refer to the Remedial Design or Remedial Action Work Plan for LUCs implementation actions, since these details may need to be adjusted periodically based on site conditions and other factors: The Groundwater RD/RA Work Plan and the LUC Soils RD/RA Work Plan will address LUC implementation actions.

### **13.2 Compliance with Applicable or Relevant and Appropriate Requirements (ARARs) and To-Be-Considered (TBC) Guidance**

The ARARs listed in Table 13-1 can be met for the remedial actions listed in this ROD. In general:

- The selected remedy (Excavation and Off-Site Disposal) for soil contamination would meet applicable ARARs. The Deed Restriction for Sites 1 and 2/27 would protect human health through limiting site use.
- The selected remedy (Limited Action (Institutional Controls and Monitoring)) for groundwater does not involve active remediation; however protection of human health would be

accomplished through restricting use of groundwater. Drinking water MCLs may be met given enough time for natural attenuation to occur.

### **13.3 Cost Effectiveness**

The proposed remedies for the soil and groundwater contaminated sites provide overall effectiveness proportionate to its costs. The overall effectiveness of a remedial alternative is determined by evaluating the following three of the five balancing criteria described in Section 10.1: 1) Long-term effectiveness and permanence; 2) Reduction in toxicity, mobility or volume (TMV) of contaminant; and 3) Short-term effectiveness (USEPA 1999). Although other remedies have lower or higher costs, the proposed remedies were chosen because they have the best cost/benefit ratio. The comparisons of cost and effectiveness for soil and groundwater remedial action alternatives are listed in Table 13-2 and Table 13-3, respectively.

The overall net present worth cost of capital and O&M cost for all the proposed remedies at JPG is estimated to be \$5,749,000 and the total cost is estimated to be \$9,891,480, as shown in Table 12-10.

### **13.4 Utilization of Permanent Solutions and Alternative Treatment Technologies (or Resource Recovery Technologies) to the Maximum Extent Practicable**

The U.S. Army, the USEPA, and the IDEM have reached the agreement on the proposed remedies for the environmental restoration of those sites requiring remedial action at JPG. The proposed remedies represent the maximum extent to which permanent solutions and treatment technologies can be utilized in a cost-effective manner at soil and groundwater contaminated sites at JPG. The proposed remedies are protective of human health and the environment and comply with ARARs. In addition, the proposed remedies provide the best balance of tradeoffs between the five balancing criteria while emphasizing the factors of long-term effectiveness; reduction of toxicity, mobility, or volume brought through treatment; and short-term effectiveness.

### **13.5 Preference for Treatment as a Principal Element**

The preference for treatment for soil as a principal element for the proposed remedy is not directly met. The contaminated soils are expected to be classified as non-hazardous waste and as such, the Land Disposal Restrictions are not applicable. Therefore, soils do not require treatment prior to disposal.

The preference for treatment of groundwater as a principal element in the proposed remedy is not met, other than treatment by natural attenuation. Limited Action (Institutional Controls and Monitoring) is the proposed remedy for the contaminated groundwater. In this case, treatment by natural attenuation is expected to occur as the remedial action to reduce the concentration of organic compounds in groundwater in the long term.

### **13.6 Five-Year Review Requirements**

NCP §300.430(f)(4)(ii) requires a 5-year review “if the remedial action results in hazardous substances, pollutants, or contaminants remaining on-site above levels that allow for unlimited use and unrestricted exposure” (USEPA 1999). Since the proposed groundwater remedy – Limited Action (Institutional Controls and Monitoring) will result in contaminants remaining in groundwater above levels that allow for unlimited use and unrestricted exposure, a statutory review will be conducted within 5 years after initiation of remedial action to ensure that the remedy is, or will be, protective of human health and the

environment. In addition, the LUC put on Sites 1, and 2/27, will be included in a 5-Year Review as long as contamination exists that prevents unrestricted access or reuse of the sites. Sites 9/10 are governed by the May 2000 MOA between the Army, USFWS, and the Air Force.

[END OF SECTION]

## **14 DOCUMENTATION OF SIGNIFICANT CHANGES**

The Proposed Plan was released for public comment on February 20, 2004. A Public Notice was placed in the following newspapers inviting public comment on the proposed remedies:

- The Courier Journal and Louisville Times
- The North Vernon Plain Dealer
- The Madison Courier
- The Versailles Republican

A public presentation was held on March 23, 2004 at the Madison-Jefferson County Area Public Library at 402 W. Main Street in Madison, Indiana. The Army reviewed all written comments submitted during the public comment period, which ran from February 20, 2004 to March 31, 2004. It was determined that no significant changes to the remedies, as originally identified in the Proposed Plan, were necessary or appropriate.

[END OF SECTION]

## **15 REFERENCES**

- United States Environmental Protection Agency (U.S. EPA), 1991. A Guide to Principal Threat and Low Level Threat Wastes. Office of Solid Waste and Emergency Response, Superfund Publication: 9380.3-06FS. November.
- Department of the Army, Department of the Air Force, and the Department of the Interior - United States Fish and Wildlife Service (FWS), May 2000. *Jefferson Proving Ground Firing Range Memorandum of Agreement*.
- Ebasco Environmental, 1990b. *Master Environmental Plan: Jefferson Proving Ground, Madison, Indiana*. Prepared for U.S. Army Toxic and Hazardous Materials Agency, Aberdeen Proving Ground, Maryland.
- Montgomery Watson, August 2001. *Final Decision Document Addendum, No Further Action, Sites 5 and 6*.
- MWH, September 2002. *Final Phase II Remedial Investigation, Jefferson Proving Ground, Madison Indiana*
- MWH, August 2003. Final Feasibility Study, Jefferson Proving Ground, Madison Indiana
- MWH, February 2004. *Final Proposed Plan, Sites 1, 2/27, 3/4, 7/21B, 9/10, 12A, 12B, 12C, 14, and 21A/30*.
- The Earth Technology Corporation (TETC), December 1993. *Community Environmental Response Facilitation Act (CERFA) Report, Draft Report, Jefferson Proving Ground, Madison, Indiana*; prepared for U.S. Army Environmental Center (USAEC), Aberdeen Proving Ground, Maryland.
- USAEHA, 1988. *Interim Final Report, Groundwater Contamination Survey No. 38-26-0306-89, Evaluation of Solid Waste Management Units, Jefferson Proving Ground, Madison, Indiana*.
- USEPA, 1990. *Environmental Audit: Jefferson Proving Ground, Madison, Indiana*, prepared by the National Enforcement Investigations Center, Denver, Colorado.
- USEPA 1988. *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA*
- USEPA, November 1991. A Guide to Principle Threat and Low Level Threat Wastes, OSWER Directive 9380.3-06FS
- USEPA, 1999. A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents. Office of Solid Waste and Emergency Response. EPA-540-98-031. July.
- USEPA, 2000. *BIOCHLOR Natural Attenuation Decision Support System User's manual Version 1.0*. National Risk Management Research Laboratory, Office of Research and Development. EPA/600/R-00/008. 54 pp.
- USEPA and Department of Navy, October 2003. *Principles and Procedures for Specifying, Monitoring and Enforcement of Land Use Controls and Other Post-ROD Actions*.

Vail Research and Technology, 1993. *Radon Monitoring Results for the Army Radon Reduction Program, JPG.*

[END OF SECTION]

### **III. COMMUNITY PARTICIPATION**

#### **RESPONSIVENESS SUMMARY**

##### **Jefferson Proving Ground**

##### **Record of Decision**

The *Final Proposed Plan for Sites 1, 2/27, 3/4, 7/21B, 9/10, 12A, 12B, 12C, 14, and 21A/30 for Jefferson Proving Ground (JPG)* was released on February 20, 2004. Copies of the Proposed Plans were mailed to those persons who had expressed an interest, posted on the JPG internet web site at [www.jpg.army.mil/environmental/final\\_proposed\\_plan.pdf](http://www.jpg.army.mil/environmental/final_proposed_plan.pdf), and copies were included in JPG's repository.

In accordance with Section 117 of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980, 42 U.S.C. Section 9617, the U.S. Army held a public comment period from February 20 to March 31, 2004, a period of more than 30 calendar days. A public presentation was held on March 23, 2004 at the Jefferson County Public Library in Madison, Indiana. Ten people attended the meeting, including:

- Three people representing the USEPA, IDEM, and the JPG RAB.
- Three people from the public.
- One person from the local newspaper.
- Three people associated with the Army.

The purpose of this Responsiveness Summary is to document the Army's responses to comments received during the public comment period. These comments were considered prior to selection of the final remedy for soil and groundwater contamination at the sites included in this Record of Decision at the Jefferson Proving Ground. The remedy is documented in the U.S. Army's Record of Decision (ROD). This responsiveness section is divided into two subsections as recommended by OSWER 9230.0-06:

- Stakeholder Issues and Lead Agency Responses
- Technical and Legal Issues.

#### **1 STAKEHOLDER ISSUES AND LEAD AGENCY RESPONSES**

Written comments were received from three parties consisting of:

- The USEPA in a letter dated March 31, 2004.
- Save the Valley Inc. in a letter dated March 29, 2004
- Mr. O'Neill, a member of the community, in an undated letter.

Save the Valley Inc. and USEPA concurred with the preferred Alternatives to remediate contaminated soils and groundwater at Sites 1, 2/27, 3/4, 7/21B, 9/10, 12A, 12B, 12C, 14, and 21A/30. In addition, the

IDEM previously concurred with these preferred Alternatives in a letter dated December 15, 2003. The comments received on the ROD involve the NFA sites presented in the ROD. The comments from these three parties can be organized into the following five categories:

- Depleted Uranium Testing.
- Sampling of Pesticides at Harberts Creek
- Sediment Sample Testing at Harberts Creek
- NFA Sites Need Further Characterization
- Additional Antimony Characterization Testing

Comments are included with the Army's response below.

### **1.1 Depleted Uranium Testing**

A comment by Mr. O'Neill states: "The Depleted Uranium (DU) should be tested. The amount of Beta radiation may depend on when the rods were removed from the reactor. Radiation can occur from drilling mud, contaminated cement or naturally (not likely in this country)."

**Response:** The DU portion of the JPG is not part of the Sites included with this ROD. Therefore, this comment is not applicable to this ROD.

### **1.2 Sampling of Pesticides at Harberts Creek**

A comment by Mr. O'Neill states "Harberts Creek needs monitoring for pesticides lest JPG gets undeserved credit for contamination".

**Response:** Harberts Creek itself has not been sampled for pesticides. However, the results of the RI do not indicate that pesticides would be a problem for Harberts Creek. The sites that are adjacent to Harberts Creek (i.e., Sites 2/27 and 3/4) had samples analyzed for pesticides. Sites 2/27 had 4 surface samples tested for pesticides, three samples had detects at levels well below USEPA Region 9 residential PRGs. Pesticide samples taken at the New Burn Site (Sites 3/4) included 12 samples at four different depths in three boreholes. Only one surface sample contained the pesticide DDE at a level exceeding the USEPA Region 9 residential PRG. This site is proposed for soils remediation.

Samples were collected from Harberts Creek sediments and surface water during the Phase I RI. While pesticides were not included, several other analytes were included in the laboratory testing performed. Sediment samples collected from Harberts Creek were analyzed for metals, cyanide, and TPH. Surface water samples were analyzed for anions and metals (total and filtered). The risk assessment results indicated no risk associated with Harberts Creek.

### **1.3 Sediment Sample Testing at Harberts Creek**

A comment by Save the Valley states: “We have some concerns about the arsenic, aluminum, beryllium, chromium, iron, manganese, and vanadium concentrations detected in sediment samples from Harberts Creek. Further investigation seems warranted. The recommended deed restrictions for no residential use do seem prudent.”

**Response:** Harberts Creek sediment sampling indicated concentrations of the metals listed above. However, aluminum, beryllium, and vanadium are at concentrations below current USEPA Region 9 residential PRGs. In addition, it should be noted that arsenic and manganese concentrations are equivalent to background levels. The human health risk assessment was performed for these contaminants, as well as chromium and iron. Results indicated that there is no risk associated with these contaminant levels in Harberts Creek. As a result of the ecological assessment, the aquatic habitat of Harberts Creek does not show impact from former site activities.

### **1.4 NFA Sites Need Further Characterization**

USEPA commented: “It is USEPA’s position that several of the sites in the Remedial Investigation that is being proposed for “no further remedial action planned” (NFRAP) appear to have not been adequately characterized and may warrant being brought forward in a feasibility study (FS) to determine if a remedial action should be taken and/or institutional control (i.e., non-residential use, etc.) should be placed on them.”

**Response:** As indicated in Table 2-1 of the ROD, 24 of the 54 sites were removed from the RI/FS process as a result of the Phase I RI. Technical Memoranda were prepared and NFA was approved for these sites (refer to Table 5-1).

Of the remaining 30 sites, 15 were considered NFA as a result of the Phase II RI and these sites are the ones to which the above comment refers. (The rationale for NFA for these sites is described in the Final Phase II RI and summarized in Table 5-1 of the ROD.)

No further characterization is required for these sites for the following reasons:

- Four sites have agency-approved documents,
- Three sites gained verbal approval at a face-to-face meeting as documented in meeting minutes,
- Five sites had interim removal actions where confirmation sampling verified that USEPA Region 9 residential PRGs were met,
- Two sites had agreement that the Phase I characterization was adequate, and the
- The one remaining site was justified by the human health risk assessment.

The list below further illustrates that additional characterization is not required at the NFA sites:

- Sites having agency-approved documents:
  - Sites 5 and 6 have an approved Decision Document for NFA.
  - Site 13 has an approved Construction Completion Report for the interim soils removal action that was performed in 2000.

- Site 33 has an approved Construction Completion Report for the interim soils removal action that was performed in 2000.
- Sites having verbal approval:
  - Sites 28, 29, and 39 were discussed in the face-to-face meeting held at JPG on June 29 through July 31, 2003 attended by the Army, USEPA, IDEM, and Save the Valley representatives. These sites were reviewed and all parties agreed that NFA was appropriate. Therefore, no additional characterization was warranted.
- Sites having interim removal action:
  - Site 8 had a soils removal action and confirmation sampling verified that USEPA Region 9 residential PRGs were met.
  - Site 15 had a soils removal action and confirmation sampling verified that USEPA Region 9 residential PRGs were met.
  - Site 25 had a soils removal action and confirmation sampling verified that USEPA Region 9 residential PRGs were met.
  - Site 26 had a soils removal action and confirmation sampling verified that USEPA Region 9 residential PRGs were met.
  - Site 42 had an interim remedial action and confirmation sampling verified that USEPA Region 9 residential PRGs were met.
- Sites with agreement that characterization was adequate:
  - Site 31 was characterized during the Phase I RI investigation. An agreement was reached between the Army and the agencies after the Phase I RI that the site was adequately characterized. In addition, note that the human health risk assessment indicated that risks and hazards are at acceptable levels.
  - Site 38 was characterized during the Phase I RI investigation. An agreement was reached between the Army and the agencies after the Phase I RI that the site was adequately characterized. In addition, note that the human health risk assessment indicated that risks and hazards are at acceptable levels.
- Remaining Site deemed NFA as a result of the human health risk assessment:
  - Site 34 had metals contamination but at levels below USEPA PRGs except for manganese and aluminum, which also exceed PRGs in background samples. In addition, note that the human health risk assessment indicated that risks are at acceptable levels.

Based on this information, it is the Army's opinion that these 15 sites included as NFA Sites in this ROD have been adequately characterized.

## **1.5 Additional Antimony Characterization Testing**

USEPA had the following comment: "Based on the Army's response to Restoration Advisory Board (RAB) Comment #5 on the Draft Remedial Investigation (dated May 22, 2003) and several of U.S. EPA's comments on the Final Remedial Investigation (RI) dated May 22, 2003, the Army agreed to address the

lack of usable antimony data in the Uncertainty Section of the RI Report, or in the FS for sites that were carried forward into the Proposed Plan. U.S. EPA agrees with including antimony in the metals analysis during confirmation sampling of the Proposed Plan sites that require remedial actions. However, it does not appear that all of the discussions pertaining to antimony data adequately address the potential impact on human health or ecological risks. It is not clear from information presented in the RI whether antimony was included as an analyte during confirmatory sampling at the remedial removal sites 13, 28/29/39 and 33. [This should read "... Sites 13, 28/29/30 and 33]. However, because remedial removal actions were taken at these five sites, U.S. EPA is not as concerned with antimony as with all of the other RI sites that are proposed for no further action (NFRAP).

In addition, for sites where antimony data were rejected during Phase I of the RI, and additional samples for antimony were not collected during Phase II of the RI, the only mention of antimony data in the Uncertainty Sections of the RI states that "[T]he absence of antimony analytical data may underestimate risk to human health and ecological receptors." These statements do not explain whether antimony would have the potential to pose significant risk human health or ecological receptors if present. It appears that the Army's rationale for ruling out antimony as a potential contaminant of concern (COC) has not been proven."

**Response:** This USEPA comment addresses the NFA sites of the ROD with respect to antimony characterization. The USEPA states in their comment that they are not as concerned about antimony at the sites for which soils removal actions have been performed, and they list Sites 13, 28, 29, 30, and 33. The fifteen NFA sites are reviewed above in response to the comment regarding further characterization testing. Removing the five sites the USEPA listed as not being as concerned about, leaves 10 remaining NFA sites. Removing the other NFA sites that have had soil removal actions (Sites 8, 15, 25, 26, and 42), and therefore do not require further characterization of antimony, leaves 5 remaining NFA sites. It should be noted that Sites 15, 25, 26, and 42 had usable antimony results and the removal actions were successful in meeting PRGs. These remaining 5 sites do not require further characterization for antimony for the following reasons:

- Sites 31 and 38 received agreement from the agencies that characterization of the site during the Phase I RI investigation was adequate.
- Sites 5 and 6 have an approved Decision Document for NFA.
- Site 34 had metals contamination but at levels below USEPA PRGs, except for manganese and aluminum. Note that background samples at JPG had manganese and aluminum concentrations that exceed the USEPA PRG as well, therefore the contamination at Site 34 could be a result of natural conditions. In addition, because metals of concern like lead and cadmium were not detected at levels above USEPA residential PRGs, it is not likely that antimony would have been detected at elevated concentrations because antimony is typically used as an alloy. The site is very small (less than 0.1 acre), and the human health risk assessment indicated that risks are at acceptable levels. For these reasons, it is the Army's opinion that no additional characterization of Site 34 is required.

For these reasons, the Army proposed these sites for NFA and considered characterization for antimony sufficient.

## **2 TECHNICAL AND LEGAL ISSUES**

There are no known outstanding technical and legal issues relating to the remedial action proposed for JPG in the ROD.

### **3 USEPA AND IDEM COMMENTS ON DRAFT FINAL ROD**

A Draft Final ROD dated May 2004 was submitted to the USEPA and the IDEM for review and comment. Agency comments, and the Army's response to comments are included in the following Appendices:

- Appendix A: USEPA comments included:
  - Appendix A1: Responses to USEPA comments submitted by the USACE in an e-mail dated July 7, 2004.
  - Appendix A2: Responses to USEPA comments submitted by MWH on behalf of the Army in an e-mail dated September 2, 2004.
- Appendix B: IDEM comments included:
  - Appendix B1: Responses to IDEM comments submitted by the USACE in an e-mail dated June 30, 2004.
  - Appendix B2: IDEM concurrence that their comments were adequately addressed was received in an IDEM e-mail dated July 14, 2004.
  - Appendix B3: Response to IDEM comments submitted by the USACE in an e-mail dated October 20, 2004.

### **4 ARMY COMMENTS ON DRAFT FINAL ROD**

A Draft Final ROD dated September 2004 was submitted to the Army for review and comment. Army comments, and the Army's response to comments are included in the following Appendices:

- Appendix C: BRACO comments included:
  - Appendix C1: Response to BRACO comments dated October 15, 2004.
  - Appendix C2: BRACO concurrence that their comments were adequately addressed was received in an e-mail dated October 15 2004.
- Appendix D: ESOH comments and response to comments dated October 15, 2004.

[END OF SECTION]

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## TABLES

TABLE 2-1

**No Further Action Sites  
South of the Firing Line  
Jefferson Proving Ground  
Madison, Indiana**

Site No.	Site Name	Phase Site Identified as NFA		Evaluated Under Other Program	Decision Document Approved
		Ph I RI	Ph II RI		
5	Wood Storage Pile		X		X
6	Wood Burning Area		X		X
8	Small Arms Indoor Range		X		
11	Burning Area for Explosive Residue	X		RCRA	
13	Old Fire Training Pit		X		
15	Burn Area South of New Incinerator		X		
16	Potential Ammo Dump Site	X			
17	Asbestos Containing Materials	X			
18	Underground Storage Tanks	X		LUST/UST	
19	Off-Site Water Supply Wells	X		LUST/UST	
20A	Building 279 Temporary Waste Storage	X			
20B	Building 305 Temporary Waste Storage	X		RCRA	
22	Building 216 Locomotive Maintenance Pit	X			
23	Building 216 Potential Solvent Disposal Pit	X			
24	Building 602 Soil Staging Area	X			
25	Paper Mill Road Disposal Area		X		
26	DRMO Storage Area		X		
28	Gator Z Mine Open Burn Area		X		
29	Gator Z Mine Scrap Disposal		X		
31	Building 227 Former Storage Pad		X		
32	Building 105 Locomotive Maintenance Pit	X			
33	Building 333 New Incinerator		X		
34	Building 136 Sandblasting Area		X		
35	Building 602 Former Underground Storage Tank	X		LUST/UST	
36	No. 2 Oil Spill at Building 103	X		LUST/UST	
37	Gasoline Station, Building 118	X		LUST/UST	
38	Northwest-Southeast Runway Test Area		X		
39	Gator Z Mine Test Area		X		
40	Discharge/Fill Pipe at Building 259	X		LUST/UST	
41	Building 281 Fuel Oil from Former UST	X		LUST/UST	
42	Building 281 Indoor Range		X		
43	Possible USTs or Wells at Artillery & Infantry Roads	X		LUST/UST	
44	Underground Concrete Vault near Airport Rail Tracks	X			
45	Possible UXO at the Airport	X			
46	Old Flare Test Sites (2) at South End Airport	X			
47	Wooded Area South of the Airport (possible test area)	X			
48	Ammunition Storage Igloos South of the Firing Line	X			
49	Explosive Ordnance South of the Firing Line	X			
50	Building 186 Wash Rack	X			

TABLE 5-1

**Summary Of Rationale for No Further Action Sites  
South of the Firing Line  
Jefferson Proving Ground  
Madison, Indiana**

<b>Site No.</b>	<b>Site Name</b>	<b>Previous Findings</b>	<b>Rationale for Removal From RI/FS and Status of NFA<sup>(b)</sup> Document</b>
8	Building 295 Small Arms Firing Range	Contaminants were metals, mainly lead, in soils and from wipe samples. Lead concentrations in soils were below the USEPA cleanup goal. In 1997, an interim remedial action was conducted consisting of cleaning the concrete and steel surfaces with water and detergent and removal of the contaminated soils. The confirmation sampling results indicated that the removal action was successful.	The interim remedial action performed at Site 8 resulted in soils meeting PRGs. In addition, the ecological risk assessment indicated no ecological risk from Site 8 existed. Based on this, Site 8 was recommended for No Further Action in the Final Phase II RI. The USEPA and IDEM concurred with that document.
11	Burning Area for Explosive Residue	Metals, two herbicides, and one SVOC were present in site soils. Human health risk assessment indicated no risks or hazards exceeding criteria.	Site 11 is being monitored and closed under a RCRA Subpart X permit. Because further investigations will be conducted during closure and post-closure activities under RCRA, it was recommended the site be removed from the RI/FS. A Technical Memorandum (Tech Memo) supporting this recommendation was submitted to the regulatory agencies in January 1996.
13	Old Fire Training Pit	Surface and subsurface soil samples at Site 13 indicate that metals, VOCs, and SVOC contaminants were present. The ecological risk assessment indicated that no risk exists at Site 13. A Soil Removal Action was performed in 2000. Confirmation sampling indicated that residual soil met PRGs.	Based on the ecological risk assessment and the successful removal action, Site 13 was recommended for No Further Action. A Position Paper was submitted in 2001 and approved by the USEPA and IDEM. The Final Phase II RI states No Further Action necessary.
15	Burn Area South of New Incinerator	The concrete pad and soils of Site 15 were contaminated with metals. A interim removal action was performed that included removal of the concrete pad and the top 12 inches of soil. Confirmation sample results indicated the removal action was successful. The ecological risk assessment indicated no risk existed.	Based on the interim removal action and the ecological risk assessment, Site 15 was recommended for No Further Action in the Final Phase II RI, to which the USEPA and IDEM concurred.

**TABLE 5-1**

**Summary Of Rationale for No Further Action Sites  
South of the Firing Line  
Jefferson Proving Ground  
Madison, Indiana**

<b>Site No.</b>	<b>Site Name</b>	<b>Previous Findings</b>	<b>Rationale for Removal From RI/FS and Status of NFA<sup>(b)</sup> Document</b>
16	Potential Ammo Dump Site	Visual inspections, review of historical aerial photographs, and geophysical surveys provided no evidence of UXO disposal at this site.	No further investigation under the RI/FS was recommended due to the lack of evidence of UXO disposal at this site. A Tech Memo summarizing these findings was submitted to the regulatory agencies in December 1995 and comments were addressed and submitted July 1996. UXO Removal Actions performed for western portion, which included Site 16.
17	Asbestos-Containing Materials	Many buildings contained asbestos materials including pipe insulation, wallboard, roofing, siding, and floor tiles. The Phase I RI included a comprehensive survey of the facilities including a detailed inspection of 345 buildings and a sampling and analysis program. A separate document was produced and submitted to the regulatory agencies.	The asbestos survey conducted under the RI/FS met the objectives of identifying and quantifying hazards associated with asbestos-containing materials south of the firing line at JPG. Corrective action will be conducted under the facility's asbestos abatement program regulated under TSCA. Therefore, no further investigation is required under the RI/FS. A Tech Memo was submitted September 1995 and response to Agency comments in December 1995.
18	Underground Storage Tanks	Twenty-five tanks that were removed or out of service during the Phase I RI were evaluated through a records search, previous data, field screening, and soil sampling and analysis. The USACE remediated 18 locations where releases to soils occurred under an ongoing UST remediation program.	It was recommended that all of the UST sites included in Site 18 be removed from the RI/FS and be addressed by the USACE under the UST program. The IDEM LUST/UST branch is overseeing this program; cleanup, verification sampling, and monitoring will comply with IDEM requirements. A Tech Memo was submitted November 1995 and comments were received from IDEM in January 1996. The Army has received approval from IDEM for all UST Sites with the exception of Site 27 -Former Fire Station House.
19	Off-Site Water Supply Wells	Field screening and soil boring sampling detected no VOC contamination and only low levels of VOCs were detected in field screening samples. All detected contaminants were below state action levels.	The contaminated soil adjacent to the former USTs was remediated as part of the ongoing UST program being overseen by the IDEM LUST/UST branch. A report documenting the cleanup was submitted to IDEM. No further investigation was recommended because remediation was completed following state guidance. A Tech Memo was submitted November 1995 and comments were received from IDEM in January 1996. Closure letter received from IDEM. Property has been transferred.

TABLE 5-1

**Summary Of Rationale for No Further Action Sites  
South of the Firing Line  
Jefferson Proving Ground  
Madison, Indiana**

<b>Site No.</b>	<b>Site Name</b>	<b>Previous Findings</b>	<b>Rationale for Removal From RI/FS and Status of NFA<sup>(b)</sup> Document</b>
20A	Building 279 Temporary Storage Area	Site 20A was used for temporary storage of hazardous wastes from 1981 to 1982. The site was mistakenly reported on the facility's Part A Application under RCRA. A closure plan was submitted to the state and USEPA while the Phase I RI was being conducted.	A letter from the State of Indiana stating approval of the closure of Site 20A was received during the Phase I RI. As a result, it was recommended that the site be removed from the RI/FS. Supporting documentation was presented in a Tech Memo submitted to the regulatory agencies in September 1995. Responses to comments were submitted in December 1995.
20B	Building 305 Temporary Waste Storage Area	Closure plans were prepared under RCRA at the time of the Phase I RI. Visual inspections, records searches, personnel interviews, and soil boring sampling and analysis resulted in the identification of pesticide-related contamination and metals contamination. No current risks to human health exceed regulatory criteria.	Since site closure is being conducted under RCRA, cleanup, verification sampling, and monitoring will be performed in accordance with RCRA requirements. As a result, it was recommended that no further investigation be performed under the RI/FS. A Tech Memo was prepared and submitted to the agencies in January 1997.
22	Building 216 Locomotive Maintenance Pit	A site inspection resulted in the conclusion that no contaminant releases to the environment have occurred from the concrete pit.	No evidence for contaminant releases exists. Therefore, no further investigation under the RI/FS is warranted. This recommendation was submitted to the regulatory agencies in a Tech Memo in November 1995. IDEM and USEPA concluded that this site does not represent a threat to human health or the environment.
23	Potential Solvent Disposal Pit	Results of RI drilling and sampling and a field screening survey indicate that no VOC contamination is present and personnel interviews indicate that a disposal pit never existed at this site.	Since characterization of this site resulted in a determination that no contaminants are present and that the disposal pit never existed, it was recommended that the site be removed from the RI/FS as a No Further Action site. A Tech Memo was prepared and submitted to the regulatory agencies in November 1995. IDEM and USEPA concluded that this site does not represent a threat to human health or the environment.
24	Soil Staging Area at Building 602	A surface soil sample collected in a drainage immediately adjacent to the former soil staging area indicated total petroleum hydrocarbon (TPH) contamination exceeding State of Indiana action levels is present. A second sample in the drainage was non-detect for TPH. Contamination appears to be limited.	Due to limited extent of contamination, previous removal of the stockpiled soils, and low estimated risks to human health and the environment, this site was recommended for no further investigation and removal from the RI/FS as a No Further Action site. A Tech Memo was submitted November 1995 and comments were received from IDEM in January 1996.

TABLE 5-1

**Summary Of Rationale for No Further Action Sites  
South of the Firing Line  
Jefferson Proving Ground  
Madison, Indiana**

<b>Site No.</b>	<b>Site Name</b>	<b>Previous Findings</b>	<b>Rationale for Removal From RI/FS and Status of NFA<sup>(b)</sup> Document</b>
25	Papermill Road Disposal Area	Surface and subsurface soil samples indicated SVOC, TPH, pesticide and metal contamination existed. The ecological risk assessment indicated no adverse ecological effects existed. A interim removal action was successful in removing the contaminated soils.	Based on the ecological risk assessment and the success of the removal action, a Tech Memo was submitted in October 1988 suggesting No Further Action. The Final Phase RI recommended this site for No Further Action as well, and was approved by USEPA and IDEM.
26	DRMO Storage Area and Possible Storage Sites South of DRMO	Soil samples results indicated metal contamination of 2 areas. A soils interim removal action was conducted and confirmation sampling indicated residual soils met PRGs.	Due to the successful removal action, Site 26 was recommended for No Further Action in the Final Phase II RI, which was approved by USEPA and IDEM.
28	Gator Z Open Burn Area (Site 28), (Site 29), and Gator Z Mine Test Area	Soil samples indicated metal contamination was present. An interim measures removal action was performed and confirmation samples indicated that residual soils met PRGs.	Based on the success of the removal action, Site 28 was recommended for No Further Action in the Final Phase II RI. After meeting with USEPA and IDEM at the Site, NFA was approved for the site.
29	Gator Z Mine Scrap Disposal Area	Sediment and surface water samples indicated metal contamination was present in the pond sediment but not in the surface water. An interim measures removal action was performed to remove debris and contaminated sediment from the pond. Confirmation samples indicated that residual soils met PRGs.	Based on the success of the removal action and the reestablishment of the aquatic environment, Site 29 was recommended for No Further Action in the Final Phase II RI. After meeting with USEPA and IDEM at the Site, NFA was approved for the site.
31	Building 227 Former Storage Pad	Soil boring samples indicated TPH concentrations and metals were present. Results of the human health risk assessment for Site 31 indicate that risks and hazards are at acceptable levels. No ecological risk was identified for this site.	Based on the results of the human health and ecological risk assessment, No Further Action was recommended in the Final Phase II RI, which was approved.
32	Building 105 Locomotive Maintenance Pit and Former Lead Casting Area	Inspection of the locomotive maintenance pit revealed that the pit was completely enclosed by concrete and contained no drain. No visible cracks or evidence of a release was identified. The former lead casting area was found to contain lead in the vent hood. The Army subsequently dismantled and properly disposed of the vent hood eliminating this potential hazard.	Since no evidence of contamination exists for Building 105 after removal of the vent hood, it was recommended that the site be removed from the RI/FS as a No Further Action site. A Tech Memo was prepared and submitted to the regulatory agencies in September 1995. Responses to agency comments were submitted in January 1996. Property has been transferred.

TABLE 5-1

**Summary Of Rationale for No Further Action Sites  
South of the Firing Line  
Jefferson Proving Ground  
Madison, Indiana**

<b>Site No.</b>	<b>Site Name</b>	<b>Previous Findings</b>	<b>Rationale for Removal From RI/FS and Status of NFA<sup>(b)</sup> Document</b>
33	Building 333 New Incinerator	Soil samples indicated metal and dioxin/furan contamination was present. Results of the ecological risk assessment indicated that the contaminants present at Site 33 posed little risk to ecological receptors. A soil removal action was performed as a result of the human health risk assessment. Confirmation sampling results indicated that dioxin contamination exceeding PRGs remained in a few samples, although only one exceeded background levels. A risk calculation was performed for those concentrations, indicating levels within the USEPA's target risk range.	Based on the results of the human health and ecological risk assessment, No Further Action was recommended in the Final Phase II RI. A Construction Completion Report was prepared and approved by USEPA and IDEM.
34	Building 136 Sandblasting Area	Soil samples around the perimeter of a concrete pad at Building 136 indicated metal contamination was present. Results of the human health risk assessment indicated that no risks exceeding USEPA criteria are present. The ecological risk assessment indicated that there are no adverse ecological effects at this site.	Based on the results of the human health and ecological risk assessment, No Further Action was recommended in the Final Phase II RI, which was approved by USEPA and IDEM.
35	Former Leaking UST	Reports of a spill caused by the removal of a UST prompted a cleanup of this site. Near-surface soil samples in the surface water pathway were collected to evaluate if the cleanup was complete. Additionally, a field survey for VOCs was performed. TPHs were found to be present in the soils but at levels below state action criteria.	Contamination at Site 35 is surrounded from contamination from Site 12A (Building 602 Solvent Pit). It was recommended that further investigation of the site be performed as part of the Site 12A investigation and that Site 35 be removed from the RI/FS. A Tech Memo was submitted November 1995 and comments were received from IDEM in January 1996. Received IDEM approval letter for UST Closure.
36	No. 2 Oil Spill at Building 103	Facility personnel conducted a cleanup of the spill but confirmatory samples were not collected. A records search, personnel interviews, site inspection, a screening survey, and soil boring sampling were conducted at the spill site. Soil samples collected during the Phase I RI indicate TPH contamination in near-surface soils remains in a small area.	Due to the small size of the contaminated area exceeding IDEM cleanup levels (one sample), no further investigation was determined to be warranted. It was recommended that Site 36 be removed from the RI/FS and that any future investigation, if required, be conducted by the Army under the direction of the IDEM LUST/UST program. A Tech Memo was submitted November 1995 and comments were received from IDEM in January 1996. Building 103 received closure approval from IDEM.
37	Gasoline Station Building 118	Four tanks were removed from this site in 1990. A	A 25,000-gallon diesel UST remained in place during the Phase I

TABLE 5-1

**Summary Of Rationale for No Further Action Sites  
South of the Firing Line  
Jefferson Proving Ground  
Madison, Indiana**

<b>Site No.</b>	<b>Site Name</b>	<b>Previous Findings</b>	<b>Rationale for Removal From RI/FS and Status of NFA<sup>(b)</sup> Document</b>
		water sample collected from each of the four tank excavations indicated the presence of petroleum hydrocarbon contamination. During the Phase I RI, a field screening survey for VOCs was performed and groundwater monitoring wells were installed. Contamination was found to be present only in the immediate area of the tank excavations. Cleanup of these contaminated soils was completed in 1994.	RI. Additional investigation of this tank should be completed at the time of tank removal. Therefore, it was recommended that Site 37 be removed from the RI/FS and placed under the ongoing UST remediation program being conducted by USACE in accordance with IDEM requirements. A Tech Memo was submitted November 1995 and comments were received from IDEM in January 1996. Received IDEM approval letter for closure.
38	Northwest-Southeast Runway Flare Test Area	Geophysical survey results indicated that no significant accumulation of buried metal that might represent unexploded flares or mortars exists. Soil samples indicated metal contamination was present, only beryllium exceeded its PRG. Results of the human health risk assessment for indicated that risks and hazards are at acceptable levels. The ecological risk assessment indicated that there are no adverse ecological effects at this site.	Based on the results of the geophysical survey, human health and ecological risk assessment, No Further Action was recommended in the Final Phase II RI.
39	Gator Z Mine Test Area	Soil samples indicated metal contamination was present. Results of the human health risk assessment for Site 39 indicate that risks and hazards are at acceptable levels. The ecological risk assessment indicated that there are no adverse ecological effects at this site.	Based on the results of the human health and ecological risk assessment, No Further Action was recommended in the Final Phase II RI. After meeting with USEPA and IDEM at the Site, NFA was approved for the site.
40	Discharge/Fill Pipe at Building 259	A records search and site inspection of the building and piping system indicated little likelihood of contaminant releases. A black tar-like substance on the ground adjacent to a pipe inlet was removed and a soil sample was collected immediately below the location of the substance. TPH contamination was present but confined to small area. Remediation of the soils was documented in a report to the IDEM.	The site was recommended for elimination from the RI/FS because the site has been remediated under the UST program being overseen by the IDEM LUST/UST branch. This is the agency responsible for monitoring regulatory compliance and establishing environmental procedures for USTs at JPG. A Tech Memo was submitted November 1995 and comments were received from IDEM in January 1996. Received IDEM approval letter for closure.

TABLE 5-1

**Summary Of Rationale for No Further Action Sites  
South of the Firing Line  
Jefferson Proving Ground  
Madison, Indiana**

<b>Site No.</b>	<b><u>Site Name</u></b>	<b><u>Previous Findings</u></b>	<b><u>Rationale for Removal From RI/FS and Status of NFA<sup>(b)</sup> Document</u></b>
41	Building 281 Fuel Oil from former UST	Samples collected at the time of tank removal indicated residual TPH contamination in the excavation. Phase I RI soil boring sampling indicated that only one sample contained detectable TPH. Field screening for VOCs indicate that the contamination is localized near the excavation. The contaminated soil was subsequently remediated as part of the UST program.	Remediation was conducted under the ongoing UST program at JPG according to IDEM guidance and documentation of cleanup was submitted to the IDEM LUST/UST branch. As a result, it was recommended that Site 41 be removed from the RI/FS. A Tech Memo was submitted in November 1995 and comments were received from IDEM in January 1996. Received IDEM approval letter for closure
42	Building 281 Indoor Range	The indoor range was used to test small arms and there was a low potential for lead to be transported outside of the building due to lack of roof vents. Lead dust and lead oxide inside the firing lanes were present. A interim measures remedial action was performed consisting of removal of contaminated soil on the floor, washing of walls and applying a sealant. Confirmation sample results indicated that cleanup goals were met.	Based on the results of the interim measures remedial action, No Further Action was recommended in the Final Phase II RI.
43	Possible USTs or Wells at Artillery and Infantry Roads	A site inspection, utility survey and field scan for VOCs was conducted at this suspected UST site. No evidence of a UST could be found and it was thought that the lines in question were steam lines for a building heating system.	No further investigation of this site was warranted and a recommendation was made to remove Site 43 from the RI/FS as a No Further Action site. A Tech Memo was prepared and submitted to the regulatory agencies in September 1995. Responses to agency comments were submitted in January 1996.
44	Underground Concrete Vault Near Airport Rail Tracks		A Tech Memo was submitted in November 1995 and comments were received from IDEM in January 1996. No comments have been received from USEPA. Received IDEM approval letter for closure.

TABLE 5-1

**Summary Of Rationale for No Further Action Sites  
South of the Firing Line  
Jefferson Proving Ground  
Madison, Indiana**

<b>Site No.</b>	<b>Site Name</b>	<b>Previous Findings</b>	<b>Rationale for Removal From RI/FS and Status of NFA<sup>(b)</sup> Document</b>
45	Possible Unexploded Ordnance at the Airport	A records search, personnel interviews, and geophysical surveys were conducted for the suspected UXO at the airport. Although flares were known to have been tested at the site, the geophysical survey results indicate no buried UXO is present at this site.	Due to a lack of evidence that UXO is present, it was recommended that Site 45 be removed from the RI/FS as a No Further Action site. A Tech Memo summarizing these findings was submitted to the regulatory agencies in December 1995 and comments were addressed and submitted July 1996. Finalization was postponed until UXO removal activities are resolved. UXO clearance surveys occurred 1999 and site has been cleared for unlimited use. Residual soil sampling occurred on the airport property and a sampling report was submitted in the Airport FOST.
46	Possible Flare Test Sites at South End of Airport	Personnel interview failed to yield any information on past flare testing at the south end of the airfield. A site inspection showed there was no evidence of previous testing activities.	It was recommended that Site 46 be removed from the RI/FS due to the lack of evidence of previous testing. Future UXO-related issues at JPG will be addressed by the USACE as part of their facility-wide UXO surveys and studies. A Tech Memo summarizing these findings was submitted to the regulatory agencies in December 1995 and comments were addressed and submitted July 1996. UXO clearance surveys occurred 1999 and site has been cleared for unlimited use. Residual soil sampling occurred on the airport property and a sampling report was submitted in the Airport FOST.
47	Wooded Area South of Airport	A visual site inspection, magnetometer scan, records search, and personnel interviews indicated that the surface area had been previously cleared for UXO. The magnetometer survey revealed no detectable buried metal associated with any of the crater-like pits in the area. It is unknown whether the depressions are even related to testing activities.	Because there was no evidence of testing and no indication of buried debris, Site 47 was recommended for removal from the RI/FS. The USACE also found no evidence of ordnance during a site survey conducted for the Archives Search Report. A Tech Memo summarizing these findings was submitted to the regulatory agencies in December 1995 and comments were addressed and submitted in July 1996. UXO clearance surveys occurred 1999 and site has been cleared for unlimited use. Residual soil sampling occurred on the airport property and a sampling report was submitted in the Airport FOST.

**TABLE 5-1**

**Summary Of Rationale for No Further Action Sites  
South of the Firing Line  
Jefferson Proving Ground  
Madison, Indiana**

<b>Site No.</b>	<b>Site Name</b>	<b>Previous Findings</b>	<b>Rationale for Removal From RI/FS and Status of NFA<sup>(b)</sup> Document</b>
48	Ammunition Storage Igloos South of the Firing Line	All igloos south of the Firing Line were located and an inventory listing of stored items was obtained from facility personnel. A visual inspection of each igloo was conducted for evidence of any contaminant releases. There was no evidence from these inspections that indicated that a release had occurred and the potential for a release was determined to be low.	It was concluded that no further investigation of the storage igloos was required and a recommendation was made to remove Site 48 from the RI/FS as a No Further Action site. A Tech Memo was prepared and submitted to the regulatory agencies in September 1995. Responses to agency comments were submitted in January 1996.
49	Possible Explosive Ordnance South of the Firing Line	Three possible sites for UXO were identified from a previous records search. A file search, personnel interviews, and a visual inspection failed to yield evidence of UXO.	Since there was no evidence of UXO at the three areas that make up Site 49, it was recommended the site be removed from the RI/FS. Future UXO-related issues will be addressed by the USACE as part of a facility-wide UXO study. A Tech Memo summarizing these findings was submitted to the regulatory agencies in December 1995 and comments were addressed and submitted July 1996. UXO Removal Actions occurred in 2000 and clearance for limited use has been approved. Residual sampling at the southeast parcel was conducted in Fall 2001. Sampling report was issued to Regulators February 2002.
50	Building 186 Wash Rack and Oil/Water Separator	A site inspection of the wash rack sump and the oil/water separator revealed that both were in good condition and in good working order. There were no cracks in the concrete that would allow a contaminant release. Wash rack runoff water was found to be appropriately handled through the oil/water separator and wastewater treatment plant. Operations were monitored under an NPDES permit.	Since the facility was found to be in compliance with the NPDES permit and in good condition, it was recommended that no further investigation is necessary under the RI/FS. As a result, a Tech Memo was prepared and submitted to the regulatory agencies in September 1995. Responses to agency comments were submitted in January 1996. Property transferred.

Footnotes:

(a) Remedial Investigation/Feasibility Study.

(b) No Further Action.

**Summary of Human Health and Ecological Risk Assessment  
Jefferson Proving Ground  
Madison, Indiana**

Site	Human Health Risk Summary	Ecological Risk Summary
Site 1	<ul style="list-style-type: none"> <li>No unacceptable risk exists under agricultural land use scenario.</li> <li>Under residential scenario adult and child residents would be at risk from inhalation of dust associated with wind erosion from agricultural fields. The primary COCs are metals (primarily manganese) and dioxins. However, inhalation pathway is not likely applicable since this site is currently well vegetated.</li> <li>The primary exposure pathway that resulted in 99% of the risk is due to consumption of beef and milk produced at this site. This activity does not currently occur at this site and will not in the future.</li> <li>The site is intended for industrial use. There is no practical need for further assessment.</li> </ul>	<p>Silver was the sole COC for ecological receptors. However, it was determined that no further ecological action is warranted because the suspected area of contamination is very small (less than 0.01 acres), only one COC has been identified, and the natural area surrounding the site has been highly disturbed by agricultural activities.</p>
Sites 2/27	<ul style="list-style-type: none"> <li>Under the future industrial land use scenario, there is some health hazard associated with inhalation of fugitive dusts and the COCs are aluminum, manganese, and silver. However, inhalation pathway is not likely applicable since this site is currently well vegetated.</li> <li>Residents who may potentially hunt in the area of Sites 2/27 and may wade in Harberts Creek were evaluated under a hunter scenario. Risk assessment results showed that exposure of hunters to surface water and sediment in Harberts Creek would not pose a human health concern.</li> <li>The Site is intended for industrial use. There is no human health risk or concern for these sites under the future industrial land use scenario that would warrant remediation.</li> </ul>	<p>There is no ecological risk associated with this site. Site 2 had similar macro-invertebrate and fish communities as that of an unimpacted, upstream reference area; the water quality measurements were similar; and the habitat rating for Site 2 was similar to or better than the habitat rating for the reference area. The aquatic habitat at Site 2 does not appear to be negatively impacted by former site activities</p>
Sites 3/4 and the New Burn Site	<ul style="list-style-type: none"> <li>Ingestion of groundwater is the critical exposure pathway for the residential land use scenario at Sites 3/4. The COCs in groundwater are arsenic and chromium (VI).</li> <li>Incidental ingestion of soil and ingestion of fruits/vegetables are also critical pathways for the child receptor at Site 4 Trench Area. Barium and cadmium are noncarcinogenic COCs in soil. Trichloroethylene is an additional COC in groundwater for the child receptor. In addition, lead in soil would pose a potential health concern to children.</li> <li>Incidental ingestion of soil, ingestion of homegrown fruits and vegetables, and ingestion of groundwater are critical exposure pathways for one or more receptors for the residential scenario at the New Burn Site. Benzo(a)pyrene is the primary carcinogenic COC in soil (burn area only) due to incidental soil ingestion. Zinc is the primary noncarcinogenic COC, and PAHs and 2,3,7,8- TCDD are the primary carcinogenic COCs in fruits and vegetables (burn area only).</li> <li>For the agricultural land use scenario, there is no human health concern posed at any of the areas of Site 3, 4, and the New Burn Site.</li> </ul>	<p>Based on the ecological effects data, there are few adverse ecological effects at Sites 3/4, and the New Burn Site.</p>

**Summary of Human Health and Ecological Risk Assessment  
Jefferson Proving Ground  
Madison, Indiana**

Site	Human Health Risk Summary	Ecological Risk Summary
Sites 7/21B	<ul style="list-style-type: none"> <li>The intended land use is industrial. Soils do not pose a risk for this land use scenario.</li> <li>The critical exposure pathway for future on-site worker is ingestion of groundwater, and arsenic is the only COC.</li> </ul>	Hazardous Index (HIs) and hazard quotients (HQs) based on the interim measures confirmation sampling data are within the same order of magnitude, or lower than, those observed at the reference areas.
Sites 9/10	<ul style="list-style-type: none"> <li>The primary exposure pathway(s) and COCs that pose a potential health concern are described for the refuge land use scenario.</li> <li>A site-wide evaluation was performed for risk to on-site hunters, and trespassers who may have contact with Sites 9/10 a portion of the time. The hunter and trespasser scenario would most closely characterize human exposure to these sites under a refuge/recreational land use scenario.</li> <li>Based on the risk assessment, neither hunter or trespasser exposure to the site would pose a human health risk.</li> </ul>	<ul style="list-style-type: none"> <li>The terrestrial ecosystem did not appear to be adversely effect.</li> <li>Vanadium was estimated to pose a potential concern of aquatic ecosystem if great blue herons use the pond as a feeding area. However, vanadium concentrations and potential risks in the pond appear to be comparable to back-ground levels.</li> </ul>
Site 12A	<ul style="list-style-type: none"> <li>The primary exposure pathway(s) and COCs that pose potential human health concern for the industrial land use scenario is ingestion of groundwater. This assumes that a shallow drinking water well is placed at the site for drinking water purposes.</li> <li>The compound responsible for most of the hazard is 1,1,1-trichloroethane.</li> <li>Soils do not pose a risk due to the Interim Removal Action.</li> </ul>	Based on protocols established in the preliminary ecological risk assessment (PERA) (Rust E&I 1997b), there were no potential ecological risks determined for Site 12A.
Site 12B	<ul style="list-style-type: none"> <li>The primary exposure pathway(s) and COCs that pose potential human health concern are under the industrial land use scenario.</li> <li>The critical exposure pathway is ingestion of groundwater under the assumption that a shallow drinking water well is placed at the site for drinking water purposes. The COCs for this scenario are 1,1-dichloroethylene, 1,1,1-trichloroethane, and 1,2-dichloroethane.</li> <li>Soils do not pose a risk due to the Interim Removal Action.</li> </ul>	Based on protocols established in the PERA (Rust E&I 1997b), there were no potential ecological risks determined for Site 12B.
Site 12C	<ul style="list-style-type: none"> <li>The primary exposure pathway(s) and COCs that pose potential human health concern under the industrial land use scenario is ingestion of groundwater.</li> <li>This assumes at a shallow drinking water well is placed at the site for drinking water purposes.</li> <li>The COCs for this scenario i.e., 1,1,1-trichloroethane, 1,1-dichloroethylene, and trichloroethene.</li> <li>Soils do not pose a risk due to the Interim Removal Action.</li> </ul>	Based on protocols established in the PERA (Rust E&I 1997b), there were no potential ecological risks determined for Site 12C.

**Summary of Human Health and Ecological Risk Assessment  
Jefferson Proving Ground  
Madison, Indiana**

Site	Human Health Risk Summary	Ecological Risk Summary
Site 14	<ul style="list-style-type: none"> <li>The primary exposure pathway(s) and COCs that pose a potential human health concern are under the residential land use scenario.</li> <li>The critical exposure pathway for both residential receptors (adult and child) is ingestion of groundwater, and arsenic is the sole noncarcinogenic and carcinogenic COC.</li> <li>Site soils do not represent a potential human health risk under any land use scenario; however, additional soils removal will be performed as a continuation of the 1996/97 removal action to remove residual contamination of chromium to meet USEPA Region 9 residential PRGs.</li> </ul>	There is no significant ecological risk at this location based on evaluation of the different lines of evidence.
Sites 21A/30	<ul style="list-style-type: none"> <li>The primary exposure pathway(s) and COCs that pose a potential human health concern are under the residential land use scenario.</li> <li>The critical exposure pathway for both residential receptors (adults and children) is incidental ingestion of soil and ingestion of fruits/vegetables grown in surface soil at these sites. Dieldrin is the sole COC.</li> </ul>	Based on protocols established in the PERA (Rust E&I 1997b), there were no potential ecological risks determined for Sites 21A and 30.

**Summary of Remedial Action Objectives  
Jefferson Proving Ground  
Madison, Indiana**

Site	Remedial Action Objectives
Site 1	The objective is to ensure no residential use of the property. There are no complete exposure pathways that would warrant carrying Site 1 into remediation. Being that the site already meets residential PRGs for the COC defined in the risk assessment (i.e., manganese), and the site is intended for industrial use, there is no practical need for further assessment.
Sites 2/27	The objective is to ensure no residential use of the property. There is no human health risk or concern for these sites under the future industrial land use scenario that would warrant remediation. No remedial action is required.
Sites 3/4 and the New Burn Site	<p>Although the current intended use for this area is agricultural and there are no health risks associated with agricultural land use, soils and groundwater will be remediated so that the site can be used as residential. To meet residential PRGs, soils in the Trench and the New Burn Area need to be remediated as well as groundwater at the sites. The site-specific RAOs for soils and groundwater under residential land use are:</p> <ul style="list-style-type: none"> <li>• <b>Site 3/4 (Excluding Site 4 Trench):</b> 1) Soil: There is no unacceptable risk associated with soils for residential use of this area. 2) Groundwater: The objective is to prevent exposure to contaminated groundwater to reduce noncancer risk below a hazard index (HI) of 1. If it is determined through monitoring that chromium (VI) is background or naturally occurring, further monitoring will be unnecessary and cease. If not, groundwater containing elevated concentrations of chromium (VI) will be addressed to mitigate risk. Chromium (VI) will be compared to the MCL of total chromium (100 ug/L).</li> <li>• <b>Site 4 – Trench Area:</b> 1) Soil: Remediate contaminated soils to reduce noncancer risk below acceptable levels (i.e., USEPA Region 9 PRGs). This would be accomplished by remediation of soils containing elevated concentrations of lead, barium, and cadmium to levels that are below USEPA 2002 Region 9 residential soil PRGs (400 mg/kg, 5,400 mg/kg, 3.7 mg/kg respectively) or background concentrations, whichever is higher. 2) Groundwater: Prevent exposure to contaminated groundwater to reduce noncancer risk to acceptable levels. This would be accomplished by mitigating exposure to groundwater containing concentrations of trichloroethylene above the Maximum Contaminant Level (MCL) of 5 ug/L.</li> <li>• <b>New Burn Site (Including Burn Area):</b> 1) Soil: Remediate contaminated soils to reduce cancer and noncancer risk below acceptable levels. This would be accomplished by remediation of soils containing elevated concentrations of benzo(a)pyrene, 2,3,7,8 –TCDD and zinc in the Burn Area to levels below USEPA residential PRGs, (0.6 mg/kg, <math>3.9 \times 10^{-6}</math> mg/kg, 23,000 mg/kg respectively) or background concentrations, whichever is higher. 2) Groundwater: Prevent exposure to contaminated groundwater to reduce noncancer risk to acceptable levels. If it is determined through monitoring that chromium (VI) is background or naturally occurring, further monitoring will be unnecessary and cease. If not, groundwater containing elevated concentrations of chromium (VI) will be addressed to mitigate risk. Chromium (VI) will be compared to the MCL of total chromium (100 ug/L).</li> </ul>

**Summary of Remedial Action Objectives  
Jefferson Proving Ground  
Madison, Indiana**

Site	Remedial Action Objectives
Sites 7/21B	<p>The RAOs for the industrial land use scenario include:</p> <ul style="list-style-type: none"> <li>Prevent exposure to groundwater to reduce noncancer and cancer risks to acceptable levels. If it is determined through monitoring that arsenic is background or naturally occurring, further monitoring will be unnecessary and cease. If not, groundwater containing elevated concentrations of arsenic will be addressed to mitigate risk. This would be accomplished by mitigating exposure to groundwater containing concentrations of arsenic that are above the MCL of 10 ug/L.</li> <li>No remedial action is required for soil.</li> </ul>
Sites 9/10	<p>The objective is to prevent residential/industrial use of the sites. There are no exposure pathways that would pose a human health or ecological concern at these sites under the intended refuge land use. No remedial action is required. The sites will not be transferred out of Army ownership.</p>
Site 12A	<p>The RAOs for the industrial land use scenario include:</p> <ul style="list-style-type: none"> <li>Prevent exposure to groundwater to reduce noncancer risk to acceptable levels. This could be accomplished by mitigating exposure to groundwater containing concentrations of 1,1,1-trichloroethane that are above the MCL of 200 ug/L.</li> <li>No remedial action is required for soil.</li> </ul>
Site 12B	<p>The RAOs for the industrial land use scenario include:</p> <ul style="list-style-type: none"> <li>Prevent exposure to groundwater to reduce noncancer risk to acceptable levels. This could be accomplished by mitigating exposure to groundwater containing concentrations of 1,1-dichloroethylene, 1,1,1-trichloroethane and 1,2-dichloroethane that are above their MCLs. The listed USEPA MCLs for the above compounds are as follows: 1,1-dichloroethylene 7 ug/L; 1,1,1-trichloroethane 200 ug/L; and 1,2-dichloroethane 5 ug/L.</li> <li>No remedial action is required for soil.</li> </ul>
Site 12C	<p>This site will not be transferred. However, RAOs were evaluated for the industrial land use scenario and those include:</p> <ul style="list-style-type: none"> <li>Prevent exposure to groundwater to reduce noncancer risk to acceptable levels. This could be accomplished by mitigating exposure to groundwater containing concentrations of 1,1,1-trichloroethane, 1,1-dichloroethylene, and trichloroethene that are above their MCLs. The listed USEPA MCLs for the above compounds are as follows: 1,1,1-trichloroethane 200 ug/L; 1,1-dichloroethylene 7 ug/L; and trichloroethene 5 ug/L.</li> <li>No remedial action is required for soil.</li> </ul>

**Summary of Remedial Action Objectives  
Jefferson Proving Ground  
Madison, Indiana**

Site	Remedial Action Objectives
Site 14	<p>The site-specific and land-use specific RAOs at Site 14 for residential land use include:</p> <ul style="list-style-type: none"> <li>• Prevent exposure to groundwater to reduce noncancer and cancer risks to acceptable levels. If it is determined through monitoring that arsenic is background or naturally occurring, further monitoring will be unnecessary and cease. If not, then groundwater containing elevated concentrations of arsenic will be addressed to mitigate risk. This could be accomplished by mitigating exposure to groundwater containing concentrations of arsenic that are above the MCL of 10 ug/L.</li> <li>• No remedial action is required for soil. Although no risk remains from soils at Site 14, soils will be excavated to remove the residual chromium noted in the confirmation sampling associated with the 1996/1997 removal action. The USEPA 2002 Region 9 PRG for chromium VI is 30.1 mg/kg. Confirmation sampling will be performed for metals, including antimony.</li> </ul>
Sites 21A/30	<p>The site-specific and land-use specific RAOs for soils at Sites 21A/30 are as follows for residential land use:</p> <ul style="list-style-type: none"> <li>• Remediate the soils to reduce cancer and noncancer risks to acceptable levels. This would be accomplished by remediation of soils containing elevated concentrations of dieldrin to levels that are below USEPA Region 9 residential soil PRGs or background concentrations, whichever is higher. The USEPA 2002 Region 9 PRG for dieldrin is 0.03 mg/kg.</li> </ul>

**TABLE 10-1**  
**Comparative Analysis of Remedial Alternatives for Soils**  
**Sites 3 and 4- Abandoned Landfill and New Burn Site**  
**Jefferson Proving Ground**  
**Madison, Indiana**

	<b>Overall Protection</b>	<b>Compliance with ARARs<sup>(a)</sup></b>	<b>Long-Term Effectiveness</b>	<b>Reduction of Toxicity, Mobility, or Volume Through Treatment</b>	<b>Short-Term Effectiveness</b>	<b>Implementability</b>	<b>Cost</b>	<b>Regulatory Acceptance</b>	<b>Community Acceptance</b>	
Alternative 1: No-Action	Does not meet future human health objectives. Does not meet current environmental objectives.	Does not meet possible future human health standards.	Does not meet remediation goals for future use.	There is no reduction of the toxicity, mobility, or volume of soil contaminants through treatment under this alternative.	There are no short-term hazards to human health and the environment associated with this alternative.	There are no implementability concerns.	No cost.			
<b>Ranking</b>	1	1	1	1	10	10	10	--	--	34
Alternative 2: Limited Action-Institutional Controls	Human health and environment risk minimized, but not eliminated.	Does not meet possible future human health standards.	Meets human health remediation goals for soils. Residential use precluded. Long-term maintenance required.	There is no reduction of the toxicity, mobility, or volume of soil contaminants through treatment under this alternative.	Health concerns are the construction hazards associated with installation of a fence. Minimal wildlife disruption is expected.	Readily implementable.	\$110,000			
<b>Ranking</b>	5	1	5	1	8	9	8	--	--	37
Alternative 3: Excavation and Off-Site Disposal	Identified risk to human health and environment eliminated.	Meets ARARs.	Land could be released for unrestricted use.	Toxicity, mobility and volume of contamination are removed from JPG by this alternative.	Health concerns are the construction hazards associated with excavation and backfill operations. Minimal wildlife disruption is expected.	Readily implementable.	\$1,861,000	IDEM and USEPA concur with this alternative.	As a result of the public comment period, community concurred.	
<b>Ranking</b>	10	10	10	8	2	6	2	--	--	48

## Footnotes:

- (a) Applicable or relevant and appropriate requirements.
- (b) Occupational Safety and Health Act.

**TABLE 10-2**  
**Comparative Analysis of Remedial Alternatives for Groundwater**  
**Site 3 - Explosive Burn Area and Site 4 - Abandoned Landfill and New Burn Site**  
**Jefferson Proving Ground**  
**Madison, Indiana**

	<b>Overall Protection</b>	<b>Compliance with ARARs<sup>(a)</sup></b>	<b>Long-Term Effectiveness</b>	<b>Reduction of Toxicity, Mobility, or Volume Through Treatment</b>	<b>Short-Term Effectiveness</b>	<b>Implementability</b>	<b>Cost</b>	<b>Regulatory Acceptance</b>	<b>Community Acceptance</b>	
Alternative 1: No-Action	Alternative does not meet future human health objectives. Case B may meet objectives over time.	Drinking water MCLs <sup>(b)</sup> may be met given enough time for natural attenuation to occur.	Does not meet remediation goals for future use other than through attenuation.	There is no reduction of the toxicity, mobility, or volume of water contaminants through treatment under this alternative.	There are no short-term hazards to human health and the environment associated with this alternative.	There are no implementability concerns.	No cost.			
<b>Ranking</b>	2	2	2	2	10	10	10	--	--	38
Alternative 2: Limited Action (Institutional Controls and Monitoring).	Human health and environment risk protected by land use restrictions and monitoring.	Drinking water MCLs <sup>(b)</sup> may be met given enough time for natural attenuation to occur.	Meets human health and ecological remediation goals. Monitoring required.	There is no reduction of the toxicity, mobility, or volume of contaminants through treatment under this alternative.	There are no short-term hazards to human health and the environment associated with this alternative.	There are no implementability concerns.	\$880,000	IDEM and USEPA concur with this alternative.	As a result of the public comment period, community concurred.	
<b>Ranking</b>	10	2	10	2	10	10	6	--	--	50

## Footnotes:

- (a) Applicable or relevant and appropriate requirements.  
(b) Maximum Contaminant level.

**TABLE 10-3**  
**Comparative Analysis of Remedial Alternatives for Groundwater**  
**Sites 7/21B**  
**Jefferson Proving Ground**  
**Madison, Indiana**

	<b>Overall Protection</b>	<b>Compliance with ARARs<sup>(a)</sup></b>	<b>Long-Term Effectiveness</b>	<b>Reduction of Toxicity, Mobility, or Volume Through Treatment</b>	<b>Short-Term Effectiveness</b>	<b>Implementability</b>	<b>Present Worth Cost</b>	<b>Regulatory Acceptance</b>	<b>Community Acceptance</b>	
Alternative 1: No Action	Does not meet future human health objectives, but may meet objectives over time.	Drinking water MCLs <sup>(b)</sup> are not met.	Does not meet remediation goals for future use other than through possible attenuation.	There is no reduction of the toxicity, mobility, or volume of water contaminants through treatment under this alternative.	There are no short-term hazards to human health and the environment associated with this alternative.	There are no implementability concerns.	No cost.			
<b>Ranking</b>	2	2	2	2	10	10	10	--	--	38
Alternative 2: Limited Action Institutional Controls and Monitoring	Human health and environment risk protected by land use restrictions and monitoring.	Drinking water MCLs <sup>(b)</sup> are not met.	Meets human health and ecological remediation goals. Monitoring required.	There is no reduction of the toxicity, mobility, or volume of contaminants through treatment under this alternative.	There are no short-term hazards to human health and the environment associated with this alternative.	There are no implementability concerns.	\$383,000	IDEM and USEPA concur with this alternative.	As a result of the public comment period, community concurred.	
<b>Ranking</b>	8	2	8	2	10	10	8	--	--	48
Alternative 3: Collection and Treatment	Meets the remedial action objectives of protecting human health and the environment.	Drinking water MCLs may be met. Unknown effectiveness for reducing arsenic concentrations.	Land could be released for unrestricted use. Unknown effectiveness for reducing arsenic concentrations.	Toxicity, volume and mobility of contamination are removed by this alternative. Unknown effectiveness for reducing arsenic concentrations.	Health concerns are the construction and operational hazards associated with collection and treatment operations. Minimal wildlife disruption is expected.	Implementable.	\$611,000			
<b>Ranking</b>	8	6	6	4	6	6	6	--	--	42

Footnotes:

- (a) Applicable or Relevant and Appropriate Requirements.  
(b) Maximum contaminant level.

**TABLE 10-4**  
**Comparative Analysis of Remedial Alternatives for Groundwater**  
**Site 12A - Building 602 Solvent Pit**  
**Jefferson Proving Ground**  
**Madison, Indiana**

	<b>Overall Protection</b>	<b>Compliance with ARARs<sup>(a)</sup></b>	<b>Long-Term Effectiveness</b>	<b>Reduction of Toxicity, Mobility, or Volume Through Treatment</b>	<b>Short-Term Effectiveness</b>	<b>Implementability</b>	<b>Present Worth Cost</b>	<b>Regulatory Acceptance</b>	<b>Community Acceptance</b>	
<b>Alternative 1: No Action</b>	Does not meet future human health objectives until natural attenuation reduces contaminants.	Drinking water MCLs <sup>(b)</sup> may be met given enough time.	Does not meet remediation goals for future use other than through attenuation.	There is no reduction of the toxicity, mobility, or volume of water contaminants through treatment under this alternative. Natural attenuation may eventually remove contaminants.	There are no short-term hazards to human health and the environment associated with this alternative.	There are no implementability concerns.	No cost.			
<b>Ranking</b>	2	5	2	6	10	10	10	--	--	45
<b>Alternative 2: Limited Action (Institutional Controls &amp; Monitoring)</b>	Human health and environment risk protected by use restrictions and monitoring. Natural attenuation may provide permanent protection.	Drinking water MCLs <sup>(b)</sup> may be met given enough time.	Meets human health and ecological remediation goals. Monitoring required. Land could possibly eventually be released for unrestricted use.	There is no reduction of the toxicity, mobility, or volume of water contaminants through treatment under this alternative. Natural attenuation may eventually remove contaminants.	There are no short-term hazards to human health and the environment associated with this alternative.	Readily implementable.	\$688,000	IDEM and USEPA concur with this alternative	As a result of the public comment period, community concurred.	
<b>Ranking</b>	10	5	10	6	10	10	6	--	--	57
<b>Alternative 3: Collection and Treatment</b>	Meets the RAOs of protecting human health and the environment.	Drinking water MCLs are met.	Meets human health and ecological remediation goals. Land could be released for unrestricted use.	Toxicity, volume and mobility of contamination are permanently removed by this alternative, if successful. Difficult to remove groundwater.	Health concerns are the construction and operational hazards associated with collection and treatment operations. Minimal wildlife disruption is expected.	Implementable. Construction required. Difficult to remove groundwater	\$809,000			
<b>Ranking</b>	10	10	10	8	5	3	4	--	--	50

Footnotes:

- (a) Applicable Relevant and Appropriate Requirements.  
(b) Maximum Contaminant Level.

TABLE 10-5

**Comparative Analysis of Remedial Alternatives for Groundwater  
Site 12B - Building 617  
Jefferson Proving Ground  
Madison, Indiana**

	<b>Overall Protection</b>	<b>Compliance with ARARs<sup>(a)</sup></b>	<b>Long-Term Effectiveness</b>	<b>Reduction of Toxicity, Mobility, or Volume Through Treatment</b>	<b>Short-Term Effectiveness</b>	<b>Implementability</b>	<b>Present Worth Cost</b>	<b>Regulatory Acceptance</b>	<b>Community Acceptance</b>	
<b>Alternative 1: No Action</b>	Does not meet future human health objectives until natural attenuation reduces contaminants.	Drinking water MCLs <sup>(b)</sup> may be met given enough time.	Does not meet remediation goals for future use other than through attenuation.	There is no reduction of the toxicity, mobility, or volume of water contaminants through treatment under this alternative. Natural attenuation may eventually remove contaminants.	There are no short-term hazards to human health and the environment associated with this alternative.	There are no implementability concerns.	No cost.			
<b>Ranking</b>	2	5	2	6	10	10	10	--	--	45
<b>Alternative 2: Limited Action (Institutional Controls &amp; Monitoring)</b>	Human health and environment risk protected by land use restrictions and monitoring. Natural attenuation may provide permanent protection.	Drinking water MCLs <sup>(b)</sup> may be met given enough time.	Meets human health and ecological remediation goals. Monitoring required. Land could possibly be released for unrestricted use.	There is no reduction of the toxicity, mobility, or volume of water contaminants through treatment under this alternative. Natural attenuation may eventually remove contaminants.	There are no short-term hazards to human health and the environment associated with this alternative.	Readily implementable.	\$798,000	IDEM and USEPA concur with this alternative	As a result of the public comment period, community concurred.	
<b>Ranking</b>	10	5	10	6	10	10	6	--	--	57
<b>Alternative 3: Collection and Treatment</b>	Meets the RAOs of protecting human health and the environment.	Drinking water MCLs are met.	Meets human health and ecological remediation goals. Land could be released for unrestricted use.	Toxicity, volume and mobility of contamination are permanently removed by this alternative, if successful. Difficult to remove groundwater.	Health concerns are the construction and operational hazards associated with collection and treatment operations. Minimal wildlife disruption is expected.	Implementable. Construction required. Difficult to remove groundwater.	\$1,051,080			
<b>Ranking</b>	10	10	10	8	5	3	4	--	--	50

Footnotes:

- (a) Applicable or Relevant and Appropriate Requirements  
(b) Maximum Contaminant Level

**TABLE 10-6**  
**Comparative Analysis of Remedial Alternatives for Groundwater**  
**Site 12C - Building 279**  
**Jefferson Proving Ground**  
**Madison, Indiana**

	<b>Overall Protection</b>	<b>Compliance with ARARs<sup>(a)</sup></b>	<b>Long-Term Effectiveness</b>	<b>Reduction of Toxicity, Mobility, or Volume Through Treatment</b>	<b>Short-Term Effectiveness</b>	<b>Implementability</b>	<b>Present Worth Cost</b>	<b>Regulatory Acceptance</b>	<b>Community Acceptance</b>	
<b>Alternative 1: No Action</b>	Does not meet future human health objectives until natural attenuation reduces contaminants.	Drinking water MCLs <sup>(b)</sup> may be met given enough time.	Does not meet remediation goals for future use other than through attenuation.	There is no reduction of the toxicity, mobility, or volume of water contaminants through treatment under this alternative. Natural attenuation may eventually remove contaminants.	There are no short-term hazards to human health and the environment associated with this alternative.	There are no implementability concerns.	No cost.			
<b>Ranking</b>	2	5	2	6	10	10	10	--	--	45
<b>Alternative 2: Natural Attenuation with Institutional Controls</b>	Human health and environment risk protected by land use restrictions and monitoring. Natural attenuation may provide permanent protection.	Drinking water MCLs <sup>(b)</sup> may be met given enough time.	Meets human health and ecological remediation goals. Monitoring required. Land could possibly eventually be released for unrestricted use.	There is no reduction of the toxicity, mobility, or volume of water contaminants through treatment under this alternative. Natural attenuation may eventually remove contaminants.	There are no short-term hazards to human health and the environment associated with this alternative.	Readily implementable.	\$439,000	IDEM and USEPA concur with this alternative	As a result of the public comment period, community concurred.	
<b>Ranking</b>	10	5	10	6	10	10	6	--	--	57
<b>Alternative 3: Collection and Treatment</b>	Meets the RAOs of protecting human health and the environment.	Drinking water MCLs are met through restriction of use.	Meets human health and ecological remediation goals. Land could be released for unrestricted use.	Toxicity, volume and mobility of contamination are permanently removed by this alternative.	Health concerns are the construction and operational hazards associated with collection and treatment operations. Minimal wildlife disruption is expected.	Implementable. Construction required.	\$615,000			
<b>Ranking</b>	10	10	10	10	5	5	4	--	--	54

Footnotes:

- (a) Applicable or Relevant and Appropriate Requirements.  
(b) Maximum Contaminant Level.

**TABLE 10-7**

**Comparative Analysis of Remedial Alternatives for Groundwater  
Site 14 - Yellow Sulfur Disposal Site  
Jefferson Proving Ground  
Madison, Indiana**

	<b>Overall Protection</b>	<b>Compliance with ARARs<sup>(a)</sup></b>	<b>Long-Term Effectiveness</b>	<b>Reduction of Toxicity, Mobility, or Volume Through Treatment</b>	<b>Short-Term Effectiveness</b>	<b>Implementability</b>	<b>Present Worth Cost</b>	<b>Regulatory Acceptance</b>	<b>Community Acceptance</b>	
Alternative 1: No-Action	Does not meet future human health objectives unless natural attenuation reduces contaminants.	Drinking water MCLs <sup>(b)</sup> are not met.	Does not meet remediation goals for future use other than through attenuation.	There is no reduction of the toxicity, mobility, or volume of water contaminants through treatment under this alternative..	There are no short-term hazards to human health and the environment associated with this alternative.	There are no implementability concerns.	No cost.			
<b>Ranking</b>	2	2	2	2	10	10	10	--	--	38
Limited Action (Alternative 2: Institutional Controls and monitoring)	Human health and environment risk protected in short term by land use restrictions and monitoring. Natural attenuation may provide permanent protection.	Drinking water MCLs are met through restriction of use.	Meets human health and ecological remediation goals. Long-term surveillance required. Land could possibly eventually be released for unrestricted use.	Toxicity, mobility, or volume of contaminants are eliminated through treatment under this alternative..	There are no short-term hazards to human health and the environment associated with this alternative.	Implementable.	\$340,000	IDEM and USEPA concur with this alternative	As a result of the public comment period, community concurred.	
<b>Ranking</b>	10	10	10	2	10	10	6	--	--	58
Alternative 3: Collection and Treatment	Meets the remedial action objectives of protecting human health and the environment.	Drinking water MCLs are met.	Land could be released for unrestricted use.	Toxicity, volume and mobility of contamination are permanently removed by this alternative.	Health concerns are the construction and operational hazards associated with collection and treatment operations. Minimal wildlife disruption is expected.	Implementable.	\$540,000			
<b>Ranking</b>	10	10	10	10	4	5	5	--	--	54

Footnotes:

- (a) Applicable or Relevant and Appropriate Requirements.
- (b) Maximum contaminant level.

**TABLE 10-8**  
**Comparative Analysis of Remedial Alternatives for Soils**  
**Sites 21A/30 –Building 204 Temporary Storage Area**  
**Jefferson Proving Ground**  
**Madison, Indiana**

	<b>Overall Protection</b>	<b>Compliance with ARARs<sup>(a)</sup></b>	<b>Long-Term Effectiveness</b>	<b>Reduction of Toxicity, Mobility, or Volume Through Treatment</b>	<b>Short-Term Effectiveness</b>	<b>Implementability</b>	<b>Present Worth Cost</b>	<b>Regulatory Acceptance</b>	<b>Community Acceptance</b>	
Alternative 1: No-Action	Does not meet future human health objectives. Does not meet current environmental objectives.	Does not meet possible future human health standards.	Does not meet remediation goals for future use.	There is no reduction of the toxicity, mobility, or volume of soil contaminants through treatment under this alternative.	There are no short-term hazards to human health and the environment associated with this alternative.	There are no implementability concerns.	No cost.			
<b>Ranking</b>	1	1	1	1	10	10	10	--	--	34
Alternative 2: Limited Action-Institutional Controls	Human health and environment risk minimized, but not eliminated.	Does not meet all future human health standards.	Meets human health remediation goals for soils. Residential use precluded. Long-term maintenance required.	There is no reduction of the toxicity, mobility, or volume of soil contaminants through treatment under this alternative.	Health concerns are the construction hazards associated with installation of a fence. Minimal wildlife disruption is expected.	Readily implementable.	\$92,000			
<b>Ranking</b>	6	6	4	2	8	9	6	--	--	41
Alternative 3: Excavation and Off-Site Disposal	Identified risk to human health and environment eliminated.	Meets ARARs.	Land could be released for unrestricted use.	Toxicity, mobility and volume of contamination are removed from JPG by this alternative.	Health concerns are the construction hazards associated with excavation and backfill operations. Minimal wildlife disruption is expected.	Readily implementable.	\$117,000	IDEM and USEPA concur with this alternative	As a result of the public comment period, community concurred.	
<b>Ranking</b>	10	10	10	8	2	6	5	--	--	51

Footnotes:

(a) Applicable or Relevant and Appropriate Requirements.

TABLE 12 -1

**COST ESTIMATE SUMMARY**  
**Alternative 3 - Soils Excavation and Off-Site Disposal**  
**Sites 3, 4, and the New Burn Site - Soils RA**  
**Jefferson Proving Ground**  
**Madison, Indiana**

DESCRIPTION	QTY	UNIT	UNIT COST	TOTAL	DISCOUNT FACTOR (7%)	PRESENT WORTH
<b>CAPITAL COSTS:</b>						
Planning Documents (QAPP, SSHP, WP, etc.)	1	LS	\$30,000	\$30,000		
Construction Documentation	1	LS	\$20,000	\$20,000		
Clearing and Grubbing, Site Prep	0.1	ACRE	\$2,500	\$250		
Excavation	1500	TONS	\$170	\$255,000		
Transportation/Hauling	1500	TONS	\$20	\$30,000		
Disposal	1500	TONS	\$350	\$525,000		
Confirmation Sampling Trench Area	30	EA	\$250	\$7,500		
Confirmation Sampling New Burn Area	20	EA	\$1,400	\$28,000		
Characterization Tests	22	EA	\$2,000	\$44,000		
Stockpiling	1500	TONS	\$20	\$30,000		
Backfilling	1500	TONS	\$24	\$36,000		
Seeding/Mulch/Fertilizer	0.1	ACRE	\$1,500	\$150		
<b>SUBTOTAL</b>				<b>\$1,005,900</b>		
Contingency (15% scope + 15% bid)	30%			\$301,770		
Mobilization/Demobilization	25%			\$251,475		
Permitting and Fees	10%			\$100,590		
Project Management (bid/construction)	20%			\$201,180		
<b>TOTAL CAPITAL COSTS</b>				<b>\$1,860,915</b>	1.000	<b>\$1,860,915</b>
<b>TOTAL PRESENT NET WORTH OF ALTERNATIVE 3</b>						<b>\$1,861,000</b>

**NOTES:**

Includes excavate soils until confirm samples are done. Assumes 3 man- 2 day, all equipment, labor, H&S, dust control, oversight.

Assume 1.5 tons/cy soil density. Unit costs based on previous soil removal activities at JPG.

Confirmation testing assumes 30 tests in the trench area tested for metals and VOCs. Tests are \$250 total for each sample taken.

Confirmation testing assumes 20 tests in the New Burn Area, tested for zinc, PAHs, and Dioxins. Test are \$1400 for each sample taken.

Characterization samples assume 22.5 tons/rolloff and 1/3 of the rollofts are tested. Unit cost based on previous work at JPG.

Backfill assumes material, placement, and compaction. Unit cost based on previous work at JPG.

FS cost estimate accuracy range -30% to +50% as suggested by EPA "A Guide to Developing and Documenting Cost

Estimates During the Feasibility Study.

TABLE 12-2

**COST ESTIMATE SUMMARY**  
**Alternative 2 - Limited Action (Institutional Controls and Monitoring)**  
**Sites 3, 4, and the New Burn Site - Groundwater RA**  
**Jefferson Proving Ground**  
**Madison, Indiana**

DESCRIPTION	QTY	UNIT	UNIT COST	TOTAL		
CAPITAL COSTS:						
Sentry Well Installation	2	Well	\$7,500	\$15,000		
Planning Documents (QAPP, SSHP, WP, etc.)	1	LS	\$20,000	\$20,000		
Deed Restriction Document Support	1	LS	\$5,000	\$5,000		
SUBTOTAL				\$40,000		
Contingency	20%			\$8,000		
Permitting and Fees	10%			\$4,000		
Project Management	5%			\$2,000		
TOTAL CAPITAL COSTS				\$54,000		
ANNUAL O&M COSTS:						
Groundwater Sampling	2	Event	\$11,000	\$22,000		
Groundwater Laboratory Analysis	2	Event	\$10,000	\$20,000		
Annual Report	1	YEAR	\$5,000	\$5,000		
Database Update	1	YEAR	\$3,000	\$3,000		
SUBTOTAL				\$50,000		
Contingency	10%			\$5,000		
Project Management	20%			\$10,000		
TOTAL ANNUAL COSTS				\$65,000		
PERIODIC COSTS:						
Five Year CERCLA Review Report	1	5YR	\$5,000	\$5,000		
Update Institutional Control Plan	1	5YR	\$2,800	\$2,800		
Contingency	5%			\$390		
Project Management	5%			\$390		
SUBTOTAL AT 5 YEARS				\$8,580		
SUMMARY OF PRESENT WORTH ANALYSIS						
YEAR	CAPITAL COST	ANNUAL O&M COST	PERIODIC COST	TOTAL COST	DISCOUNT FACTOR (7%)	PRESENT WORTH
0	\$54,000		\$0	\$54,000	1	\$54,000
1		\$65,000		\$65,000	0.9346	\$60,749
2		\$65,000		\$65,000	0.8734	\$56,771
3		\$65,000		\$65,000	0.8163	\$53,060
4		\$65,000		\$65,000	0.7629	\$49,589
5		\$65,000	\$8,580	\$73,580	0.7130	\$52,463
6		\$65,000		\$65,000	0.6663	\$43,310
7		\$65,000		\$65,000	0.6227	\$40,476
8		\$65,000		\$65,000	0.5820	\$37,830
9		\$65,000		\$65,000	0.5439	\$35,354
10		\$65,000	\$8,580	\$73,580	0.5083	\$37,401
11		\$65,000		\$65,000	0.4751	\$30,882
12		\$65,000		\$65,000	0.4440	\$28,860
13		\$65,000		\$65,000	0.4150	\$26,975
14		\$65,000		\$65,000	0.3878	\$25,207
15		\$65,000	\$8,580	\$73,580	0.3624	\$26,665
16		\$65,000		\$65,000	0.3387	\$22,016
17		\$65,000		\$65,000	0.3166	\$20,579
18		\$65,000		\$65,000	0.2959	\$19,234
19		\$65,000		\$65,000	0.2765	\$17,973
20		\$65,000	\$8,580	\$73,580	0.2584	\$19,013
21		\$65,000		\$65,000	0.2415	\$15,698
22		\$65,000		\$65,000	0.2257	\$14,671
23		\$65,000		\$65,000	0.2109	\$13,709
24		\$65,000		\$65,000	0.1971	\$12,812
25		\$65,000	\$8,580	\$73,580	0.1842	\$13,553
26		\$65,000		\$65,000	0.1722	\$11,193
27		\$65,000		\$65,000	0.1609	\$10,459
28		\$65,000		\$65,000	0.1504	\$9,776
29		\$65,000		\$65,000	0.1406	\$9,139
30		\$65,000	\$8,580	\$73,580	0.1314	\$9,668
TOTALS	\$54,000	\$1,950,000	\$51,480	\$2,055,480		\$879,079
TOTAL PRESENT NET WORTH OF ALTERNATIVE 2						\$880,000

**NOTES:**

Sampling event requires 2 people for 4 days.

The present worth for the annual costs is determined over a 30 year period.

FS cost estimate accuracy range -30% to +50% as suggested by EPA "A Guide to Developing and Documenting Cost

Estimates During the Feasibility Study.

**TABLE 12-3**  
**COST ESTIMATE SUMMARY**  
**Alternative 2 - Limited Action (Institutional Controls and Monitoring)**  
**Site 7/21B - GW RA**  
**Jefferson Proving Ground**  
**Madison, Indiana**

DESCRIPTION	QTY	UNIT	UNIT COST	TOTAL		
CAPITAL COSTS:						
Planning Documents (QAPP, SSHP, WP, etc.)	1	LS	\$10,000	\$10,000		
Deed Restriction Document Support	1	LS	\$5,000	\$5,000		
SUBTOTAL				\$15,000		
Contingency	20%			\$3,000		
Permitting and Fees	10%			\$1,500		
Project Management	5%			\$750		
TOTAL CAPITAL COSTS				\$20,250		
ANNUAL O&M COSTS:						
Groundwater Sampling	2	QTR	\$7,390	\$14,780		
Groundwater Laboratory Analysis	2	QTR	\$1,200	\$2,400		
Annual Report	1	YEAR	\$5,000	\$5,000		
Database Update	1	YEAR	\$3,000	\$3,000		
SUBTOTAL				\$25,180		
Contingency	10%			\$2,518		
Project Management	20%			\$5,036		
TOTAL ANNUAL COSTS				\$32,734		
PERIODIC COSTS:						
Five Year CERCLA Review Report	1	5YR	\$5,000	\$5,000		
Update Institutional Control Plan	1	5YR	\$2,800	\$2,800		
Contingency	5%			\$390		
Project Management	5%			\$390		
SUBTOTAL AT 5 YEARS				\$8,580		
SUMMARY OF PRESENT WORTH ANALYSIS						
YEAR	CAPITAL COST	ANNUAL O&M COST	PERIODIC COST	TOTAL COST	DISCOUNT FACTOR (7%)	PRESENT WORTH
0	\$20,250		\$0	\$20,250	1	\$20,250
1		\$32,734		\$32,734	0.9346	\$30,593
2		\$32,734		\$32,734	0.8734	\$28,590
3		\$32,734		\$32,734	0.8163	\$26,721
4		\$32,734		\$32,734	0.7629	\$24,973
5		\$32,734	\$8,580	\$41,314	0.7130	\$29,457
6		\$32,734		\$32,734	0.6663	\$21,811
7		\$32,734		\$32,734	0.6227	\$20,383
8		\$32,734		\$32,734	0.5820	\$19,051
9		\$32,734		\$32,734	0.5439	\$17,804
10		\$32,734	\$8,580	\$41,314	0.5083	\$21,000
11		\$32,734		\$32,734	0.4751	\$15,552
12		\$32,734		\$32,734	0.4440	\$14,534
13		\$32,734		\$32,734	0.4150	\$13,585
14		\$32,734		\$32,734	0.3878	\$12,694
15		\$32,734	\$8,580	\$41,314	0.3624	\$14,972
16		\$32,734		\$32,734	0.3387	\$11,087
17		\$32,734		\$32,734	0.3166	\$10,364
18		\$32,734		\$32,734	0.2959	\$9,686
19		\$32,734		\$32,734	0.2765	\$9,051
20		\$32,734	\$8,580	\$41,314	0.2584	\$10,676
TOTALS	\$20,250	\$654,680	\$34,320	\$709,250		\$382,833
TOTAL PRESENT NET WORTH OF ALTERNATIVE 2						\$383,000

**NOTES:**

Sampling event requires 2 people for 4 days.

The present worth for the annual costs is determined over a 20 year period.

FS cost estimate accuracy range -30% to +50% as suggested by EPA "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study".

TABLE 12-4

**COST ESTIMATE SUMMARY**  
**Alternative 2 - Limited Action (Institutional Controls and Monitoring)**  
**Site12A - GW RA**  
**Jefferson Proving Ground**  
**Madison, Indiana**

DESCRIPTION	QTY	UNIT	UNIT COST	TOTAL		
CAPITAL COSTS:						
Planning Documents (QAPP, SSHP, WP, etc.)	1	LS	\$10,000	\$10,000		
Deed Restriction Document Support	1	LS	\$5,000	\$5,000		
SUBTOTAL				\$15,000		
Contingency	20%			\$3,000		
Permitting and Fees	10%			\$1,500		
Project Management	5%			\$750		
TOTAL CAPITAL COSTS				\$20,250		
ANNUAL O&M COSTS:						
Groundwater Sampling	2	Event	\$9,500	\$19,000		
Groundwater Laboratory Analysis	2	Event	\$6,600	\$13,200		
Annual Report	1	YEAR	\$5,000	\$5,000		
Database Update	1	YEAR	\$3,000	\$3,000		
SUBTOTAL				\$40,200		
Contingency	10%			\$4,020		
Project Management	20%			\$8,040		
TOTAL ANNUAL COSTS				\$52,260		
PERIODIC COSTS:						
Five Year CERCLA Review Report	1	5YR	\$5,000	\$5,000		
Update Institutional Control Plan	1	5YR	\$2,800	\$2,800		
Contingency	5%			\$390		
Project Management	5%			\$390		
SUBTOTAL AT 5 YEARS				\$8,580		
SUMMARY OF PRESENT WORTH ANALYSIS						
YEAR	CAPITAL COST	ANNUAL O&M COST	PERIODIC COST	TOTAL COST	DISCOUNT FACTOR (7%)	PRESENT WORTH
0	\$20,250		\$0	\$20,250	1	\$20,250
1		\$52,260		\$52,260	0.9346	\$48,842
2		\$52,260		\$52,260	0.8734	\$45,644
3		\$52,260		\$52,260	0.8163	\$42,660
4		\$52,260		\$52,260	0.7629	\$39,869
5		\$52,260	\$8,580	\$60,840	0.7130	\$43,379
6		\$52,260		\$52,260	0.6663	\$34,821
7		\$52,260		\$52,260	0.6227	\$32,542
8		\$52,260		\$52,260	0.5820	\$30,415
9		\$52,260		\$52,260	0.5439	\$28,424
10		\$52,260	\$8,580	\$60,840	0.5083	\$30,925
11		\$52,260		\$52,260	0.4751	\$24,829
12		\$52,260		\$52,260	0.4440	\$23,203
13		\$52,260		\$52,260	0.4150	\$21,688
14		\$52,260		\$52,260	0.3878	\$20,266
15		\$52,260	\$8,580	\$60,840	0.3624	\$22,048
16		\$52,260		\$52,260	0.3387	\$17,700
17		\$52,260		\$52,260	0.3166	\$16,546
18		\$52,260		\$52,260	0.2959	\$15,464
19		\$52,260		\$52,260	0.2765	\$14,450
20		\$52,260	\$8,580	\$60,840	0.2584	\$15,721
21		\$52,260		\$52,260	0.2415	\$12,621
22		\$52,260		\$52,260	0.2257	\$11,795
23		\$52,260		\$52,260	0.2109	\$11,022
24		\$52,260		\$52,260	0.1971	\$10,300
25		\$52,260	\$8,580	\$60,840	0.1842	\$11,207
26		\$52,260		\$52,260	0.1722	\$8,999
27		\$52,260		\$52,260	0.1609	\$8,409
28		\$52,260		\$52,260	0.1504	\$7,860
29		\$52,260		\$52,260	0.1406	\$7,348
30		\$52,260	\$8,580	\$60,840	0.1314	\$7,994
TOTALS	\$20,250	\$1,567,800	\$51,480	\$1,639,530		\$687,242
TOTAL PRESENT NET WORTH OF ALTERNATIVE 2						\$688,000

**NOTES:**

Sampling event requires 2 people for 4 days.

Analytical includes a full VOC scan.

The present worth for the annual costs is determined over a 30 year period.

FS cost estimate accuracy range -30% to +50% as suggested by EPA "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study".

**TABLE 12-5**  
**COST ESTIMATE SUMMARY**  
**Alternative 2 - Limited Action (Institutional Controls and Monitoring)**  
**Site12B - GW RA**  
**Jefferson Proving Ground**  
**Madison, Indiana**

DESCRIPTION	QTY	UNIT	UNIT COST	TOTAL		
CAPITAL COSTS:						
Well Replacement Contingency	6	WELL	\$10,000	\$60,000		
Planning Documents (QAPP, SSHP, WP, etc.)	1	LS	\$10,000	\$10,000		
Deed Restriction Document Support	1	LS	\$5,000	\$5,000		
SUBTOTAL				\$75,000		
Contingency	20%			\$15,000		
Permitting and Fees	10%			\$7,500		
Project Management	5%			\$3,750		
TOTAL CAPITAL COSTS				\$101,250		
ANNUAL O&M COSTS:						
Groundwater Sampling	2	Event	\$9,500	\$19,000		
Groundwater Laboratory Analysis	2	Event	\$7,500	\$15,000		
Annual Report	1	YEAR	\$5,000	\$5,000		
Database Update	1	YEAR	\$3,000	\$3,000		
SUBTOTAL				\$42,000		
Contingency	10%			\$4,200		
Project Management	20%			\$8,400		
TOTAL ANNUAL COSTS				\$54,600		
PERIODIC COSTS:						
Five Year CERCLA Review Report	1	5YR	\$5,000	\$5,000		
Update Institutional Control Plan	1	5YR	\$2,800	\$2,800		
Contingency	5%			\$390		
Project Management	5%			\$390		
SUBTOTAL AT 5 YEARS				\$8,580		
SUMMARY OF PRESENT WORTH ANALYSIS						
YEAR	CAPITAL COST	ANNUAL O&M COST	PERIODIC COST	TOTAL COST	DISCOUNT FACTOR (7%)	PRESENT WORTH
0	\$101,250		\$0	\$101,250	1	\$101,250
1		\$54,600		\$54,600	0.9346	\$51,029
2		\$54,600		\$54,600	0.8734	\$47,688
3		\$54,600		\$54,600	0.8163	\$44,570
4		\$54,600		\$54,600	0.7629	\$41,654
5		\$54,600	\$8,580	\$63,180	0.7130	\$45,047
6		\$54,600		\$54,600	0.6663	\$36,380
7		\$54,600		\$54,600	0.6227	\$33,999
8		\$54,600		\$54,600	0.5820	\$31,777
9		\$54,600		\$54,600	0.5439	\$29,697
10		\$54,600	\$8,580	\$63,180	0.5083	\$32,114
11		\$54,600		\$54,600	0.4751	\$25,940
12		\$54,600		\$54,600	0.4440	\$24,242
13		\$54,600		\$54,600	0.4150	\$22,659
14		\$54,600		\$54,600	0.3878	\$21,174
15		\$54,600	\$8,580	\$63,180	0.3624	\$22,896
16		\$54,600		\$54,600	0.3387	\$18,493
17		\$54,600		\$54,600	0.3166	\$17,286
18		\$54,600		\$54,600	0.2959	\$16,156
19		\$54,600		\$54,600	0.2765	\$15,097
20		\$54,600	\$8,580	\$63,180	0.2584	\$16,326
21		\$54,600		\$54,600	0.2415	\$13,186
22		\$54,600		\$54,600	0.2257	\$12,323
23		\$54,600		\$54,600	0.2109	\$11,515
24		\$54,600		\$54,600	0.1971	\$10,762
25		\$54,600	\$8,580	\$63,180	0.1842	\$11,638
26		\$54,600		\$54,600	0.1722	\$9,402
27		\$54,600		\$54,600	0.1609	\$8,785
28		\$54,600		\$54,600	0.1504	\$8,212
29		\$54,600		\$54,600	0.1406	\$7,677
30		\$54,600	\$8,580	\$63,180	0.1314	\$8,302
TOTALS	\$101,250	\$1,638,000	\$51,480	\$1,790,730		\$797,278
TOTAL PRESENT NET WORTH OF ALTERNATIVE 2						\$798,000

**NOTES:**

Sampling event requires 2 people for 4 days.  
Analytical includes a full VOC scan.  
The present worth for the annual costs is determined over a 30 year period.  
FS cost estimate accuracy range -30% to +50% as suggested by EPA "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study".

**TABLE 12-6**  
**COST ESTIMATE SUMMARY**  
**Alternative 2 - Limited Action (Institutional Controls and Monitoring)**  
**Site12C - GW RA**  
**Jefferson Proving Ground**  
**Madison, Indiana**

DESCRIPTION	QTY	UNIT	UNIT COST	TOTAL		
CAPITAL COSTS:						
Planning Documents (QAPP, SSHP, WP, etc.)	1	LS	\$10,000	\$10,000		
Deed Restriction Document Support	1	LS	\$5,000	\$5,000		
SUBTOTAL				\$15,000		
Contingency	20%			\$3,000		
Permitting and Fees	10%			\$1,500		
Project Management	5%			\$750		
TOTAL CAPITAL COSTS				\$20,250		
ANNUAL O&M COSTS:						
Groundwater Sampling	2	Event	\$7,600	\$15,200		
Groundwater Laboratory Analysis	2	Event	\$3,000	\$6,000		
Annual Report	1	YEAR	\$5,000	\$5,000		
Database Update	1	YEAR	\$3,000	\$3,000		
SUBTOTAL				\$29,200		
Contingency	10%			\$2,920		
Project Management	20%			\$5,840		
TOTAL ANNUAL COSTS				\$37,960		
PERIODIC COSTS:						
Five Year CERCLA Review Report	1	5YR	\$5,000	\$5,000		
Update Institutional Control Plan	1	5YR	\$2,800	\$2,800		
Contingency	5%			\$390		
Project Management	5%			\$390		
SUBTOTAL AT 5 YEARS				\$8,580		
SUMMARY OF PRESENT WORTH ANALYSIS						
YEAR	CAPITAL COST	ANNUAL O&M COST	PERIODIC COST	TOTAL COST	DISCOUNT FACTOR (7%)	PRESENT WORTH
0	\$20,250		\$0	\$20,250	1	\$20,250
1		\$37,960		\$37,960	0.9346	\$35,477
2		\$37,960		\$37,960	0.8734	\$33,154
3		\$37,960		\$37,960	0.8163	\$30,987
4		\$37,960		\$37,960	0.7629	\$28,960
5		\$37,960	\$8,580	\$46,540	0.7130	\$33,183
6		\$37,960		\$37,960	0.6663	\$25,293
7		\$37,960		\$37,960	0.6227	\$23,638
8		\$37,960		\$37,960	0.5820	\$22,093
9		\$37,960		\$37,960	0.5439	\$20,646
10		\$37,960	\$8,580	\$46,540	0.5083	\$23,656
11		\$37,960		\$37,960	0.4751	\$18,035
12		\$37,960		\$37,960	0.4440	\$16,854
13		\$37,960		\$37,960	0.4150	\$15,753
14		\$37,960		\$37,960	0.3878	\$14,721
15		\$37,960	\$8,580	\$46,540	0.3624	\$16,866
16		\$37,960		\$37,960	0.3387	\$12,857
17		\$37,960		\$37,960	0.3166	\$12,018
18		\$37,960		\$37,960	0.2959	\$11,232
19		\$37,960		\$37,960	0.2765	\$10,496
20 <sup>(1)</sup>		\$37,960	\$8,580	\$46,540	0.2584	\$12,026
TOTALS	\$20,250	\$759,200	\$34,320	\$813,770		\$438,196
TOTAL PRESENT NET WORTH OF ALTERNATIVE 2						\$439,000

**NOTES:**

Sampling event requires 2 people for 5 days.

Analytical includes a full VOC scan.

The present worth for the annual costs is determined over a 20 year period.

FS cost estimate accuracy range -30% to +50% as suggested by EPA "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study".

**FOOTNOTE:**

<sup>(1)</sup> The 20-year O&M period is based on the decreasing levels of contamination since the source was removed in 2000.  
(EPA #10)

TABLE 12-7

**COST ESTIMATE SUMMARY**  
**Alternative 2 - Limited Action (Institutional Controls and Monitoring)**  
**Site 14 - Yellow Sulfur Disposal Site**  
**Jefferson Proving Ground**  
**Madison, Indiana**

DESCRIPTION	QTY	UNIT	UNIT COST	TOTAL		
CAPITAL COSTS:						
Planning Documents (QAPP, SSHP, WP, etc.)	1	LS	\$10,000	\$10,000		
Deed Restriction Document Support	1	LS	\$5,000	\$5,000		
SUBTOTAL				\$15,000		
Contingency	20%			\$3,000		
Permitting and Fees	10%			\$1,500		
Project Management	5%			\$750		
TOTAL CAPITAL COSTS				\$20,250		
ANNUAL O&M COSTS:						
Groundwater Sampling	2	QTR	\$6,000	\$12,000		
Groundwater Laboratory Analysis	2	QTR	\$1,000	\$2,000		
Annual Report	1	YEAR	\$5,000	\$5,000		
Database Update	1	YEAR	\$3,000	\$3,000		
SUBTOTAL				\$22,000		
Contingency	10%			\$2,200		
Project Management	20%			\$4,400		
TOTAL ANNUAL COSTS				\$28,600		
PERIODIC COSTS:						
Five Year CERCLA Review Report	1	5YR	\$5,000	\$5,000		
Update Institutional Control Plan	1	5YR	\$2,800	\$2,800		
Contingency	5%			\$390		
Project Management	5%			\$390		
SUBTOTAL AT 5 YEARS				\$8,580		
SUMMARY OF PRESENT WORTH ANALYSIS						
YEAR	CAPITAL COST	ANNUAL O&M COST	PERIODIC COST	TOTAL COST	DISCOUNT FACTOR (7%)	PRESENT WORTH
0	\$20,250		\$0	\$20,250	1	\$20,250
1		\$28,600		\$28,600	0.9346	\$26,730
2		\$28,600		\$28,600	0.8734	\$24,979
3		\$28,600		\$28,600	0.8163	\$23,346
4		\$28,600		\$28,600	0.7629	\$21,819
5		\$28,600	\$8,580	\$37,180	0.7130	\$26,509
6		\$28,600		\$28,600	0.6663	\$19,056
7		\$28,600		\$28,600	0.6227	\$17,809
8		\$28,600		\$28,600	0.5820	\$16,645
9		\$28,600		\$28,600	0.5439	\$15,556
10		\$28,600	\$8,580	\$37,180	0.5083	\$18,899
11		\$28,600		\$28,600	0.4751	\$13,588
12		\$28,600		\$28,600	0.4440	\$12,698
13		\$28,600		\$28,600	0.4150	\$11,869
14		\$28,600		\$28,600	0.3878	\$11,091
15		\$28,600	\$8,580	\$37,180	0.3624	\$13,474
16		\$28,600		\$28,600	0.3387	\$9,687
17		\$28,600		\$28,600	0.3166	\$9,055
18		\$28,600		\$28,600	0.2959	\$8,463
19		\$28,600		\$28,600	0.2765	\$7,908
20		\$28,600	\$8,580	\$37,180	0.2584	\$9,607
TOTALS	\$20,250	\$572,000	\$34,320	\$626,570		\$339,038
TOTAL PRESENT NET WORTH OF ALTERNATIVE 2						\$340,000

**NOTES:**

Sampling event requires 2 people for 4 days.

The present worth for the annual costs is determined over a 20 year period.

FS cost estimate accuracy range -30% to +50% as suggested by EPA "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study".

TABLE 12-8

**COST ESTIMATE SUMMARY**  
**Continued Soil Removal - Excavation and Off-Site Disposal**  
**Site 14 - Yellow Sulfur Disposal Site**  
**Jefferson Proving Ground**  
**Madison, Indiana**

DESCRIPTION	QTY	UNIT	UNIT COST	TOTAL	DISCOUNT FACTOR (7%)	PRESENT WORTH
<b>CAPITAL COSTS:</b>						
Planning Documents (QAPP, SSHP, WP, etc.)	1	LS	\$12,000	\$12,000		
Construction Documentation	1	LS	\$10,000	\$10,000		
Clearing and Grubbing	0.025	ACRE	\$2,500	\$63		
Excavation	143	TONS	\$170	\$24,310		
Transportation/Hauling	143	TONS	\$20	\$2,860		
Disposal	143	TONS	\$350	\$50,050		
Confirmation Sampling	22	EA	\$44	\$968		
Characterization Tests	7	EA	\$2,000	\$14,000		
Stockpiling	143	TONS	\$20	\$2,860		
Backfilling	143	TONS	\$24	\$3,432		
Seeding/Mulch/Fertilizer	0.03	ACRE	\$1,500	\$45		
SUBTOTAL				\$120,588		
Contingency (15% scope + 15% bid)	30%			\$36,176		
Mobilization/Demobilization	25%			\$30,147		
Permitting and Fees	10%			\$12,059		
Project Management (bid/construction)	20%			\$24,118		
<b>TOTAL CAPITAL COSTS</b>				<b>\$223,087</b>	1.000	<b>\$223,087</b>
<b>TOTAL PRESENT NET WORTH OF ALTERNATIVE 3</b>						<b>\$224,000</b>

**NOTES:**

Includes Mag/flag/excavate soils until confirm samples are done. Assumes 3 man- 2 day, all equipment, labor, H&S, dust control, oversight.  
 Assume 1.5 tons/cy soil density. Unit costs based on previous soil removal activities at JPG.  
 Assumes 20 samples tested for chromium plus 10% for QA=22 samples. Lab test=\$22/sample plus LDC validation of \$22/samples=\$44/sample.  
 Characterization samples assume 22.5 tons/rolloff and 1 sample/rolloff. Unit cost based on previous work at JPG.  
 Backfill assumes material, placement, and compaction. Unit cost based on previous work at JPG.  
 FS cost estimate accuracy range -30% to +50% as suggested by EPA "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study".

**TABLE 12-9**  
**COST ESTIMATE SUMMARY**  
**Alternative 3 - Excavation and Off-Site Disposal**  
**Sites 21A and 30 - Soils RA**  
**Jefferson Proving Ground**  
**Madison, Indiana**

DESCRIPTION	QTY	UNIT	UNIT COST	TOTAL	DISCOUNT FACTOR (7%)	PRESENT WORTH
<b>CAPITAL COSTS:</b>						
Planning Documents (QAPP, SSHP, WP, etc.)	1	LS	\$25,000	\$25,000		
Construction Documentation	1	LS	\$15,000	\$15,000		
Clearing and Grubbing	0.025	ACRE	\$2,500	\$63		
Excavation	30	TONS	\$170	\$5,100		
Transporation/Hauling	30	TONS	\$20	\$600		
Disposal	30	TONS	\$350	\$10,500		
Confirmation Sampling	22	EA	\$44	\$968		
Characterization Tests	2	EA	\$2,000	\$4,000		
Stockpiling	60	TONS	\$20	\$1,200		
Backfilling	30	TONS	\$24	\$720		
Seeding/Mulch/Fertilizer	0.025	ACRE	\$1,500	\$38		
<b>SUBTOTAL</b>				<b>\$63,188</b>		
Contingency (15% scope + 15% bid)	30%			\$18,956		
Mobilization/Demobilization	25%			\$15,797		
Permitting and Fees	10%			\$6,319		
Project Management (bid/construction)	20%			\$12,638		
<b>TOTAL CAPITAL COSTS</b>				<b>\$116,898</b>	1.000	<b>\$116,898</b>
<b>TOTAL PRESENT NET WORTH OF ALTERNATIVE 3</b>						<b>\$117,000</b>

**NOTES:**

Includes excavate soils until confirm samples are done. Assumes 3 man- 2 day, all equipment, labor, H&S, dust control, oversight.  
Assume 1.5 tons/cy soil density. Unit costs based on previous soil removal activities at JPG.  
Assumes 20 samples tested for dieldrin plus 10% for QA = 22 samples. Lab test = \$22/sample plus LDC validation of \$22/samples = \$ 44/sample.  
Characterization samples assume 22.5 tons/rolloff and 1 sample/rolloff. Unit cost based on previous work at JPG.  
Backfill assumes material, placement, and compaction. Unit cost based on previous work at JPG.  
FS cost estimate accuracy range -30% to +50% as suggested by EPA "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study".

**TABLE 12-10**

**Summary of Proposed Plan Alternatives Costs  
Jefferson Proving Ground  
Madison, Indiana**

Summary		
Alternative Type and Location	Site	Total Costs
Institutional Controls, Deed Restriction for Residential Use	Sites 1 and 2/27	\$51,480 <sup>(1)</sup>
Alternative 2 - Limited Action (Institutional Controls and Monitoring)	Sites 3, 4, and the New Burn Site - Groundwater RA at 30 years of groundwater monitoring	\$2,056,000
Alternative 3 - Soils Excavation & Off-Site Disposal	Sites 3, 4, and the New Burn Site - Soils RA	\$1,861,000
Alternative 2 - Limited Action (Institutional Controls and Monitoring)	Site 7/21B - Groundwater RA at 20 years of groundwater monitoring	\$710,000
Alternative 2 - Limited Action (Institutional Controls and Monitoring)	Site 12A - Groundwater RA at 30 years of groundwater monitoring	\$1,640,000
Alternative 2 - Limited Action (Institutional Controls and Monitoring)	Site 12B - Groundwater RA at 30 years of groundwater monitoring	\$1,791,000
Alternative 2 - Limited Action (Institutional Controls and Monitoring)	Site 12C - Groundwater RA at 20 years of groundwater monitoring	\$814,000
Continued Soil Removal Excavation and Off-Site Disposal	Site 14 - Yellow Sulfur Disposal Site - Soils RA	\$224,000
Alternative 2 - Limited Action (Institutional Controls and Monitoring)	Site 14 - Yellow Sulfur Disposal Site - Groundwater RA at 20 years of groundwater monitoring	\$627,000
Alternative 3 - Soils Excavation & Off-Site Disposal	Sites 21A and 30 - Soils RA	\$117,000
<b>Total Cost for All Alternatives</b>		<b>\$9,891,480</b>
<b>Present Net Worth for All Alternatives</b>		

**Footnotes:**

(1) See sheet 2 of 2 of Table 12-10 for Cost Estimate Summary

TABLE 12-10

**Summary of Proposed Plan Alternatives Costs  
Sites 1 and 2/27 - Institutional Controls  
Jefferson Proving Ground  
Madison, Indiana**

DESCRIPTION	QTY	UNIT	UNIT COST	TOTAL		
CAPITAL COSTS:						
TOTAL CAPITAL COSTS				N/A		
				N/A		
ANNUAL O&M COSTS:						
TOTAL ANNUAL COSTS				N/A		
				N/A		
PERIODIC COSTS:						
Five Year CERCLA Review Report	1	5YR	\$5,000	\$5,000		
Update Institutional Control Plan	1	5YR	\$2,800	\$2,800		
Contingency	5%			\$390		
Project Management	5%			\$390		
SUBTOTAL AT 5 YEARS				\$8,580		
SUMMARY OF PRESENT WORTH ANALYSIS						
YEAR	CAPITAL COST	ANNUAL O&M COST	PERIODIC COST	TOTAL COST	DISCOUNT FACTOR (7%)	PRESENT WORTH
0	\$0		\$0	\$0	1	\$0
1		\$0		\$0	0.9346	\$0
2		\$0		\$0	0.8734	\$0
3		\$0		\$0	0.8163	\$0
4		\$0		\$0	0.7629	\$0
5		\$0	\$8,580	\$8,580	0.7130	\$6,118
6		\$0		\$0	0.6663	\$0
7		\$0		\$0	0.6227	\$0
8		\$0		\$0	0.5820	\$0
9		\$0		\$0	0.5439	\$0
10		\$0	\$8,580	\$8,580	0.5083	\$4,361
11		\$0		\$0	0.4751	\$0
12		\$0		\$0	0.4440	\$0
13		\$0		\$0	0.4150	\$0
14		\$0		\$0	0.3878	\$0
15		\$0	\$8,580	\$8,580	0.3624	\$3,109
16		\$0		\$0	0.3387	\$0
17		\$0		\$0	0.3166	\$0
18		\$0		\$0	0.2959	\$0
19		\$0		\$0	0.2765	\$0
20		\$0	\$8,580	\$8,580	0.2584	\$2,217
21		\$0		\$0	0.2415	\$0
22		\$0		\$0	0.2257	\$0
23		\$0		\$0	0.2109	\$0
24		\$0		\$0	0.1971	\$0
25		\$0	\$8,580	\$8,580	0.1842	\$1,580
26		\$0		\$0	0.1722	\$0
27		\$0		\$0	0.1609	\$0
28		\$0		\$0	0.1504	\$0
29		\$0		\$0	0.1406	\$0
30		\$0	\$8,580	\$8,580	0.1314	\$1,127
TOTALS	\$0	\$0	\$51,480	\$51,480		\$18,513
TOTAL PRESENT NET WORTH OF ALTERNATIVE 2						\$19,000

**NOTES:**

The present worth for the annual costs is determined over a 30 year period.  
 FS cost estimate accuracy range -30% to +50% as suggested by EPA "A Guide to Developing and Documenting Cost  
 Estimates During the Feasibility Study.

**Description of ARARs and TBCs for Soils RA  
Jefferson Proving Ground  
Madison, Indiana**

**I. ARARs**

<b>Authority</b>	<b>Medium</b>	<b>Requirement Citation</b>	<b>Status</b>	<b>Synopsis of Requirement</b>	<b>Actions Taken to Attain Requirement</b>
<b><i>Chemical Specific</i></b>					
Federal Regulation Drinking Water	Ground water	Federal Drinking Water maximum contaminant levels (MCLs) 40 CFR Part 141	Relevant and Appropriate	MCLs have been regulated for a number of common organic and inorganic contaminants. These levels regulate the concentrations of contaminants in public drinking water supplies and are considered relevant and appropriate for groundwater aquifers potentially used for drinking water.	The selected remedy will comply with these regulations through limited action, including institutional controls and monitored natural attenuation.
Indiana Drinking Water	Ground water	Indiana Administrative Code (IAC), Title 327, Article 8	Relevant and appropriate	Provides inorganic, organic, biological, and radioactive MCLs and goals for drinking water.	The selected remedy will comply with these regulations through limited action, including institutional controls and monitored natural attenuation.
<b><i>Location Specific</i></b>					
Federal Endangered Species Act	All	Protects endangered species within critical habitats 50 CFR Parts 200, 402, and 16 U.S.C.668	Potentially Applicable	Establishes actions to preserve endangered species	Remedies comply with this ARAR. Excavation sites are very small in comparison to the vast remaining area at JPG more conducive to the habitat of Endangered Species. The U.S. Fish and Wildlife Service will get a copy of this Soils RD/RA Project Plan.
Federal Historical and Archeological	All	Preserves historical and archeological sites and data 16 U.S.C.461 40 CFR 6301c 16 U.S.C. 461-467, 40 CFR 6301a, 16 U.S.C.470, 40 CFR 6.301, 36 CFR Part 800	Potentially Applicable	Establishes procedures to provide preservation of historical and archeological data, which might be destroyed through alternation of terrain as a result of a government activity.	Remedies comply with this ARAR. Sites involving excavation are very small and excavations are expected to be shallow. Phase I Archaeological surveys have previously been performed at JPG. Excavation are not at areas identified as containing archaeological artifacts.

**Description of ARARs and TBCs for Soils RA  
Jefferson Proving Ground  
Madison, Indiana**

**I. ARARs (Continued)**

<b>Authority</b>	<b>Medium</b>	<b>Requirement Citation</b>	<b>Status</b>	<b>Synopsis of Requirement</b>	<b>Actions Taken to Attain Requirement</b>
<i>Action Specific</i>					
Federal OSHA Worker Safety	All Media	29 CFR 1910 29 CFR 1926	Applicable	Provides general safety standards and construction related standards (excavation).	These requirements can be met.
Federal DOT Regulations	Soil/Water	49 CFR parts 170-179	Applicable	Regulates transportation of hazardous materials.	These requirements can be met for contaminated materials transported off-site.
Federal RCRA Hazardous Waste Standards - Identification and Listing of Hazardous Waste	Soil	40 CFR 261	Potentially Applicable	Establishes standards for determining if a waste is a hazardous waste.	The soils at JPG will be characterized prior to disposal. Based on RI data, it is expected that soils will not be classified as a hazardous waste.
Federal RCRA Generators of Hazardous Waste	Soil	40 CFR 262	Potentially Applicable	Establishes standards for generators of hazardous waste.	Soils at JPG are not expected to be hazardous. Therefore, these regulations are not expected to be applicable.
Federal CERCLA Off-site Disposal Regulation	Soil	40 CFR 300.440	Applicable	Facilities where wastes are disposed must be in compliance with this policy.	This requirement can be met. The landfills where the soils will be disposed will be evaluated to assess that they meet this requirement.
Federal RCRA Transport of Hazardous Waste	Soil	40 CFR 263-264	Potentially Applicable	Establishes standards for transporters of hazardous waste.	Soils at JPG are not expected to be hazardous. Therefore, these regulations are not expected to be applicable.
Federal RCRA Land Disposal Restrictions	Soil	40 CFR part 268	Potentially Applicable	Identifies Universal Treatment Standards that must be met before materials can be landfilled.	Soils at JPG are not expected to be hazardous. Therefore, these regulations are not expected to be applicable.
Indiana Solid Waste Management Laws	Soils	IAC Title 13, Article 7, Chapters 10.5 and 22	Applicable	Establishes requirements concerning solid waste management and procedures to permit and operate a landfill.	The selected remedies will meet this requirement by disposing of soils at permitted landfills.

**Description of ARARs and TBCs for Soils RA  
Jefferson Proving Ground  
Madison, Indiana**

**I. ARARs (Continued)**

<b>Authority</b>	<b>Medium</b>	<b>Requirement Citation</b>	<b>Status</b>	<b>Synopsis of Requirement</b>	<b>Actions Taken to Attain Requirement</b>
<i>Action Specific</i>					
Indiana Hazardous Waste Law	Soils	IAC Title 13, Article 7, Chapter 8.5	Potentially Applicable	Identifies requirements for proper and safe transport, treatment, storage, and disposal of hazardous wastes.	The soils at JPG are not expected to be hazardous. Therefore, these regulations are not expected to be applicable.
Indiana Environmental Hazardous Disclosure and Responsible Party Transfer Law	All	IAC Title 13, Article 7, Chapter 22.5	Applicable	Establishes requirements for environmental disclosure documents associated with property transfers.	The selected remedies will meet with this requirement through attainment of cleanup goals or by deed restrictions.

**II. TBCs**

<b>Authority</b>	<b>Medium</b>	<b>Requirement Citation</b>	<b>Status</b>	<b>Synopsis of Requirement</b>	<b>Actions Taken to Attain Requirement</b>
Federal Soil Screening Levels	Soil	USEPA Region 9 Soil PRGs	Applicable	Soil PRGs are considered as guidelines for site "screening" and as the cleanup goals for JPG.	The selected remedy will meet the soil residential PRGs by excavating the contaminated soils and performing confirmation testing.

**TABLE 13-2**  
**Cost and Effectiveness Evaluation of Soil Remedial Alternatives**  
**Jefferson Proving Ground**  
**Madison, Indiana**

Alternative	Present Worth Cost	Long-Term Effectiveness and Permanence	Reduction of Toxicity, Mobility, or Volume Through Treatment	Short-Term Effectiveness
1) No Action	Refer to Tables 10-1 to 10-8 for Present Worth Cost of Alternatives	<ul style="list-style-type: none"><li>No reduction in long-term risk to human health and the environment</li><li>Does not meet remediation goals for future use</li></ul>	<ul style="list-style-type: none"><li>No reduction of toxicity</li><li>No reduction of mobility</li><li>No reduction of volume</li></ul>	<ul style="list-style-type: none"><li>No short-term risk to human health and the environment</li></ul>
2) Limited Action – Institutional Controls		<ul style="list-style-type: none"><li>✓ Meet human health remediation goals for soils, residential use precluded</li><li>✓ Long-term maintenance required</li></ul>	<ul style="list-style-type: none"><li>≈ No reduction of toxicity</li><li>≈ No reduction of mobility</li><li>≈ No reduction of volume</li></ul>	<ul style="list-style-type: none"><li>↓ Health concern are construction hazards associated with installation of a fence</li><li>↓ Minimum wildlife disruption is expected</li></ul>
3) Excavation and Off-Site Disposal		<ul style="list-style-type: none"><li>✓ Land could be released for unrestricted use</li></ul>	<ul style="list-style-type: none"><li>✓ Remove toxicity</li><li>✓ Remove mobility</li><li>✓ Remove volume</li></ul>	<ul style="list-style-type: none"><li>≈ Health concern are construction hazards associated with excavation and backfill operations</li><li>≈ Minimum wildlife disruption is expected</li></ul>
<b>COST-EFFECTIVE SUMMARY:</b> Alternative 3 is considered to be more cost-effective compared to Alternatives 1 and 2.				
<b>Key:</b> <ul style="list-style-type: none"><li>Baseline characteristics</li><li>≈ No Change compared to previous alternative</li><li>✓ More “effective” compared to previous alternative</li><li>↓ Less “effective” compared to previous alternative</li></ul>				

**TABLE 13-3**

**Cost and Effectiveness Evaluation of Groundwater Remedial Alternatives  
Jefferson Proving Ground  
Madison, Indiana**

Alternative	Present Worth Cost	Long-Term Effectiveness and Permanence	Reduction of Toxicity, Mobility, or Volume Through Treatment	Short-Term Effectiveness
1) No Action	Refer to Tables 10-1 to 10-8 for Present Worth Cost of Alternatives	<ul style="list-style-type: none"><li>No reduction in long-term risk to human health and the environment</li><li>Does not meet remediation goals for future use</li></ul>	<ul style="list-style-type: none"><li>No reduction of toxicity</li><li>No reduction of mobility</li><li>No reduction of volume</li></ul>	<ul style="list-style-type: none"><li>No short-term risk to human health and the environment</li></ul>
2) Limited Action (Institutional Controls and Monitoring)		<ul style="list-style-type: none"><li>✓ Meet human health and ecological remediation goals</li><li>✓ Long-term monitoring required</li></ul>	<ul style="list-style-type: none"><li>≈ No reduction of toxicity</li><li>≈ No reduction of mobility</li><li>≈ No reduction of volume</li><li>✓ Natural attenuation may eventually remove organic contaminants</li></ul>	<ul style="list-style-type: none"><li>≈ No short-term risk to human health and the environment</li></ul>
3) Collection and Treatment		<ul style="list-style-type: none"><li>≈ Meet human health and ecological remediation goals</li><li>✓ Land could be released for unrestricted use</li></ul>	<ul style="list-style-type: none"><li>✓ Remove toxicity, if successful</li><li>✓ Remove mobility, if successful</li><li>✓ Remove volume, if successful</li><li>? Difficult to remove groundwater</li></ul>	<ul style="list-style-type: none"><li>↓ Health concern are construction and operational hazards associated with collection and treatment</li><li>↓ Minimum wildlife disruption is expected</li></ul>
<b>COST-EFFECTIVE SUMMARY:</b> Alternative 3 is considered to be more cost-effective compared to Alternatives 1 and 2.				
<b>Key:</b> <ul style="list-style-type: none"><li>Baseline characteristics</li><li>≈ No Change compared to previous alternative</li><li>✓ More “effective” compared to previous alternative</li><li>↓ Less “effective” compared to previous alternative</li></ul>				

## FIGURES

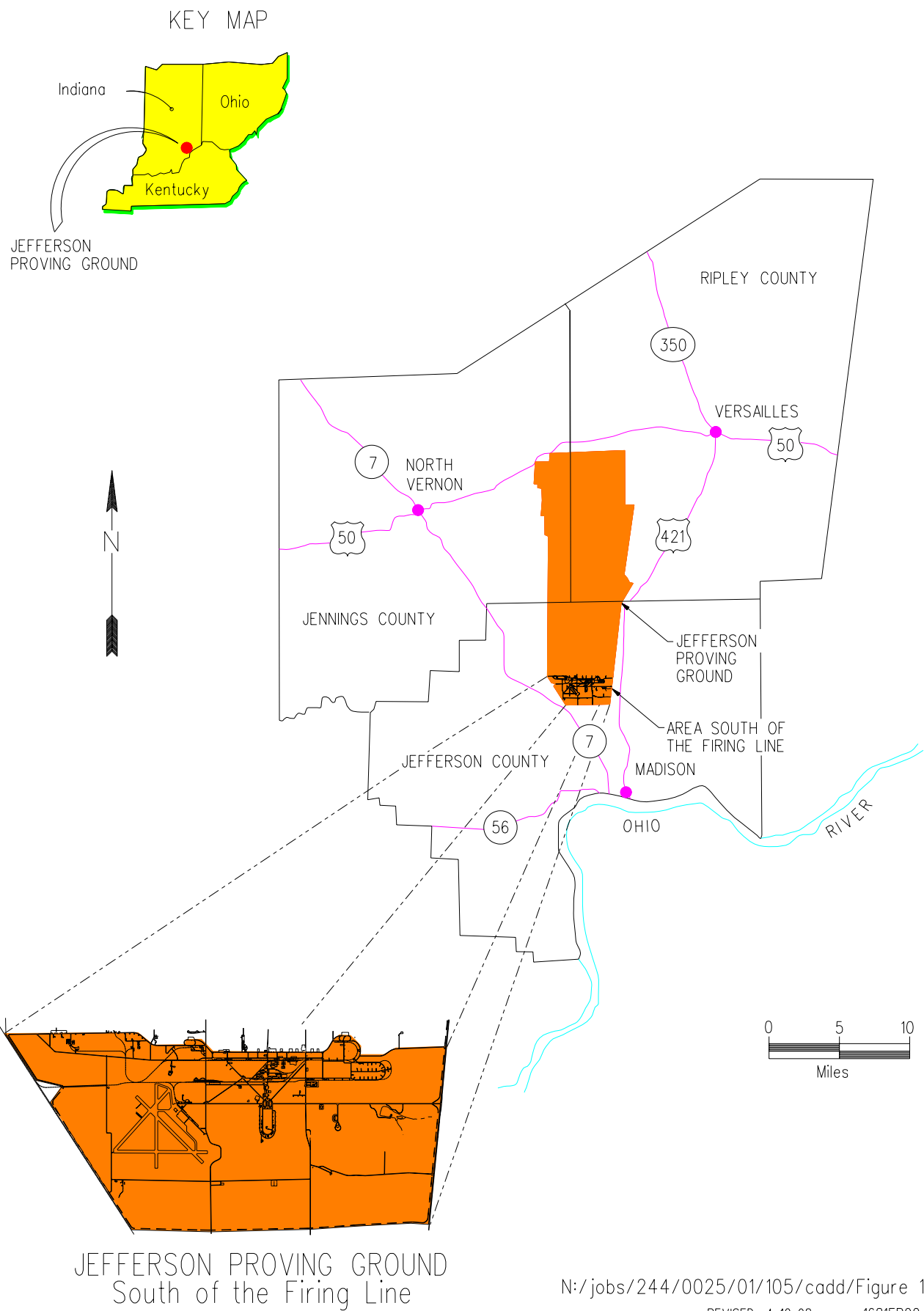
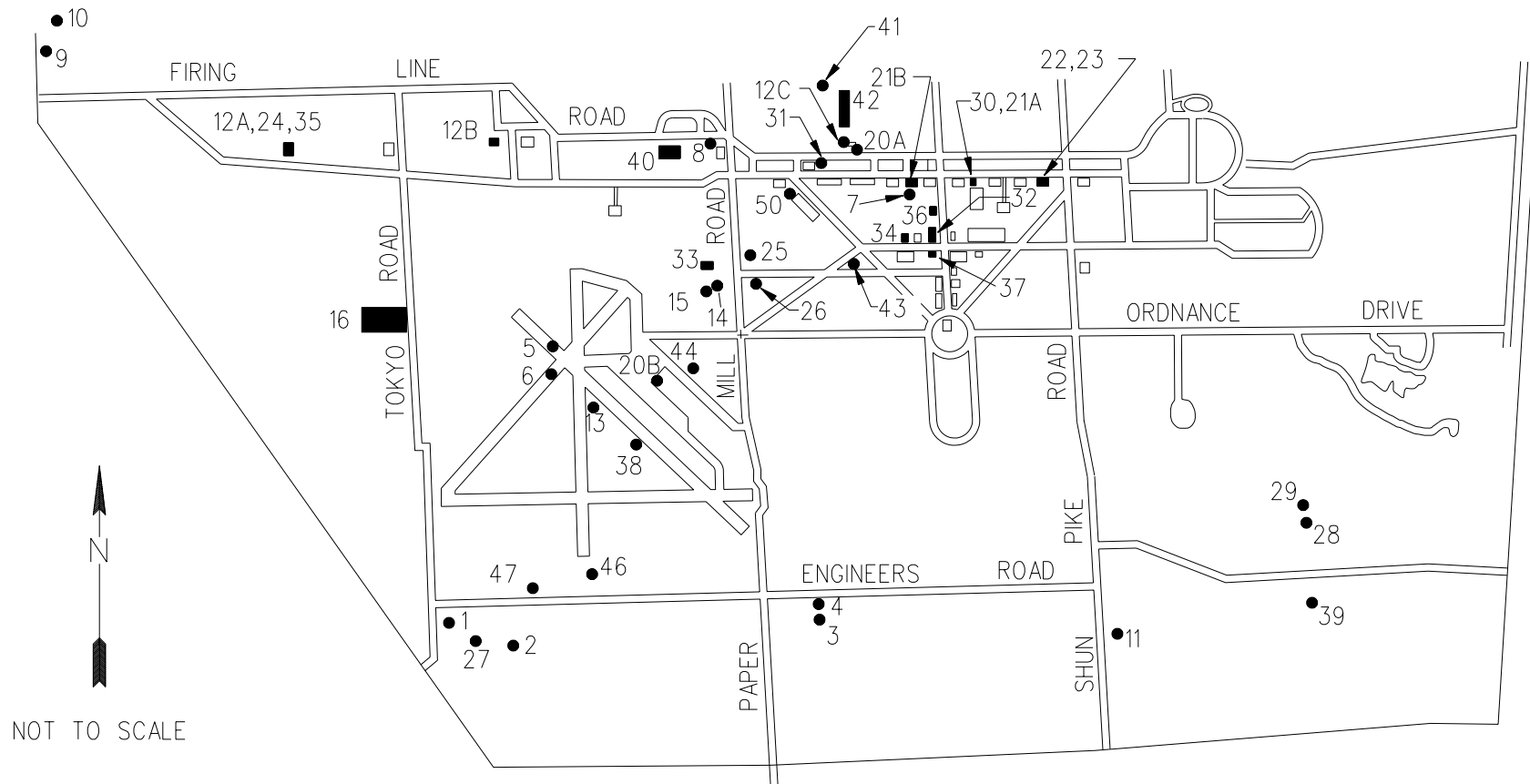


Figure 1. Site Location Map



Sites not identified on map:

- 17 Asbestos containing materials (potentially many locations)
- 18 Underground storage tanks (located at several sites)
- 19 Off-site water supply wells (not shown on map)
- 45 Possible explosive ordnance at airport (many locations)
- 48 Ammunition Storage Igloos south of the firing line (many locations)
- 49 Explosive ordnance south of the firing line (many locations)

NOTE: SITES NUMBER 30 & 21A BOTH REFER TO TEMPORARY STORAGE AREA (BUILDING 204)

N:/jobs/244/0025/01/105/cadd/Figure 2.dgn

REVISED: 5-6-98 1680FG02.DGN

Figure 2. Location of Remedial Action Sites

## **APPENDICES**

## **APPENDIX A**

### **USEPA COMMENTS AND RESPONSE TO COMMENTS ON DRAFT FINAL ROD**

- A1 July 7, 2004 USACE E-Mail
- A2 September 2, 2004 MWH E-Mail

**A1**

**JULY 7, 2004 USACE E-MAIL**



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07/07/2004 02:35 PM

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Subject: Response to EPA comments on draft final ROD

All, attached are the Army responses to EPA comments on the Draft Final ROD. Please take a look at and response as soon as possible. We would like to resolve these comments as soon as possible so that we can start the ROD through the signature process, by the end of the month. The target date for a signed ROD is late August early September.

Also, tentative schedule for construction to start for RA is the middle of September.



Thanks Brooks 68 EPA Resp to Draft Final ROD.c

**RESPONSES TO USEPA COMMENTS  
DATED JUNE 10, 2004**

**Draft Final Record of Decision  
Sites 1, 2/27, 3/4, 7/21B, 9/10, 12A, 12B, 12C, 14, and 21A/30, and No Further Action  
Sites 8, 11, 13, 15 to 19, 20A, 20B, 22 to 26, 28, 29, and 31 to 50  
Jefferson Proving Ground  
Madison, Indiana**

Following are response to comments presented in the USEPA letter dated June 11, 2004 associated with the Draft Final Record of Decision dated May 2004 for Sites 1, 2/27, 3/4, 7/21B, 9/10, 12A, 12B, 12C, 14, and 21A/30, And No Further Action Sites 8, 11, 13, 15 to 19, 20A, 20B, 22 to 26, 28, 29, and 31 to 50 at JPG.

**GENERAL COMMENTS**

1. *The cost estimates for the various groundwater remedies do not present consistent information concerning additional well installations and well replacement contingencies. For example, additional monitoring wells will be installed at Sites 3/4, 12A and 12B, but only the cost estimate for Sites 3/4 includes estimated costs for the additional well installation. Also, Site 12B is the only groundwater remedy that includes a "well replacement contingency." It is recommended that the cost estimates for the groundwater remedies be revised so that the information and cost estimates for additional well installations and well replacements are consistent.*

**Response:** Based on the approach used, it is not necessary to revise the cost estimates for groundwater remedies, because:

- Additional monitoring wells will not be constructed at Sites 12A and 12B. Sentry wells as proposed for Site 3/4, were recently installed. For Site 12B, the groundwater contamination plume was detected into the dolomite shale and for a distance down gradient, therefore a contingency was included for well replacement in the event it would be required. For Site 12A, the plume has been documented to the till/bedrock interface, not deep into the dolomite shale, therefore we do not expect to require replacement wells.
- The cost estimates for groundwater estimates presented in the ROD are the same as presented in the Proposed Plan (PP) dated February 2004. For example, the Table numbers that presented the cost estimates in the PP and ROD are: for Sites 3/4 the Table numbers are 2 (Alternative 2) and 12-2; for Site 12A the Table numbers are 4 (Alternative 2) and 12-4; and for Site 12B the Table numbers are 5 (Alternative 2) and 12-5. The cost estimates presented in the PP are those that were available to the public during the

public comment period. Comments were not received on these cost estimates during the public comment period.

Therefore, based on this approach, the groundwater estimates in the ROD do not need to be revised.

2. *The Draft Final Record of Decision (ROD) does not discuss or include any cost estimates for Sites 1, 2/27 and 9/10 in the Five-Year CERCLA Review Report. Per Section 1.2 of U.S. EPA's Comprehensive Five-Year Review Guidance (EPA 540-R-01-007) dated June 2001, a Five-Year Review should be conducted on any site which relies on restrictions of land use by humans and/or ecological populations to be protective. Since deed restrictions have been proposed for Sites 1 and 2/27 to prevent future residential use and institutional controls will be used at Sites 9/10 to limit future human use, revise the ROD to discuss the need to include these sites in the Five-Year Review process and include a cost estimate for conducting these activities.*

**Response:** The text will be revised to say that the Five-Year Review will be performed for the land use controls sites, Sites 1, 2/27, and 9/10. The cost estimate for that work is a combined \$5,000, which will be included in the text and Table 12-10 as well.

3. *According to a document titled the "Final Technical Memorandum UXO Soil Testing for the NE and SE Parcels," dated August 2002 (UXO Tech Memo), soil sampling was conducted at several locations where unexploded ordnance (UXO) were blown-in-place (BIP) in the northeast (NE) parcel along Woodfill Road and the 800-acre southeast (SE) parcel. According the UXO Tech Memo, the "purpose of the soil testing was to characterize possible explosives chemicals and metals that may be present as residual materials in soils following UXO BIP activities at the NE and SE Parcels at JPG." However, soil samples used for this characterization were composite samples which would likely dilute the concentrations of explosives and metals in the soils, as discussed below.*

*According to the UXO Tech Memo, surface soil samples collected from the BIP locations were "composites of the 0 to 12-in depth interval" (it is not clear from the UXO Tech Memo if these were composite samples from one 0 to 12-in interval, or several 0 to 12-in intervals composited together). Subsurface soil samples were composited subsamples from 4-ft cores. Soil boring logs provided in Appendix B of the UXO Tech Memo indicate that the soils in the NE and SE Parcels are silty clays (CL-ML). Also, the BIP craters were reportedly lined with plastic after the BIP activities took place. Under these circumstances, any explosives and metals resulting from the BIP activities would be expected to be within the first few inches of soil. Compositing soil materials from 0 to 12-in and 0 to 4-ft intervals would dilute any of the concentrations of chemicals in the first few inches of soil. Compositing multiple 0*

*to 12-in intervals into one composite sample would likely dilute the chemical concentrations to an even greater extent (if this was the case with the surface soil samples).*

*Also, please see U.S. EPA's comments dated February 28, 2003 and October 18, 2002 on the Finding of Suitability to Transfer (FOST) for the NE Parcel. These two U.S. EPA comment letters include our concerns with using the composite samples for human health risk assessment decisions, as opposed to using the composite samples for screening purposes; and using the Louisville Chemical Guidelines (LCG) Version 3, which has no comprehensive data validation reports. The LCG Version 3 was a work in progress and was not finalized nor approved by U.S. EPA Region 5, nor approved to be used at JPG with the Quality Assurance Project Plan (QAPP). The LCG was at Version 4 during the submittal of the UXO Soil Testing Work Plan, dated October 2001. The LCG Version 4 incorporated changes that could have directly impacted data quality, and may contain some inconsistencies in data qualification between Versions 3 and 4. Therefore, because LCG Version 3 was incomplete, U.S. EPA considers Appendix D: Quality Control Summary Report in the JPG Final Tech Memo for UXO Testing of the NE and SE Parcels to be incomplete and unsatisfactory for using to make risk-based decisions.*

*Based on the insufficient characterization activities for the UXO BIP locations in the NE and SE Parcels, additional characterization of the NE and SE Parcels appears necessary under the CERCLA process. However, U.S. EPA recommends placing institutional controls, deed restrictions and/or access restrictions on sites 45, 46, 47, 49 and the NE Parcel areas.*

**Response to UXO Sampling:** The samples collected for the UXO residual soils were collected from within the blown-in-place (BIP) locations at depths of 0 to 12 inches. Some samples were taken from areas where there was no indication that UXO had been blown in place, thus these samples were taken at a depth of 0 to 6 inches. Samples were only composited from within a BIP, composited from the sides and bottom of the BIP, which is a very small area, approximately 2 ft in diameter. Soils from each BIP location were not mixed with soils from other BIP locations. Samples that were collected at 4-ft depth were from an area in the Southeast Parcel where soils had previously been excavated to a 4-ft depth, sieved, and redistributed. Composite sampling was previously discussed in general terms with USEPA, IDEM, and the RAB representatives at the Face-to-Face meeting in Madison, Wisconsin in July/August 2002. In addition, specific discussions were included in the response to comments for the Northeast Parcel FOST dated August 29, 2003.

The results of the sampling indicated that the soils left after UXO was blown in place do not represent a source of contamination. Only one crater within the SE Parcel had explosive residue above its Region 9 Residential PRG, and only one crater within the NE Parcel had contamination above residential PRGs, that was for manganese. These craters were only approximately 2 ft in diameter; therefore, they represent a very

small area to which human and ecological receptors would have very little potential to be exposed. These two isolated exceedances of residential PRGs would not be expected to pose a human or ecological concern.

**Response to Data Validation (LCG):** The USEPA statement that the LCG Version 3 was not approved for use at JPG is not correct. The USEPA reviewed and approved the QAPP for JPG. The QAPP included references to and use of the LCG. USEPA did not make any comments about use of the LCG at the time

There are only minor differences between LCG Versions 3 and 4 and would have little, if any, impact on data quality. If you recall, we went back and looked at MWH RI data using Version 5 after we initially validated it with LCG versions 3 and 4. The changes were minor and usually favored the Army. We suggest that the USEPA discuss this with their chemist who reviewed the data quality comparison.

## **SPECIFIC COMMENTS**

1. ***II - Decision Summary, Section 6.1, Current Land Use, Page 6-1; Figure 3, Facility Wide Conceptual Site Model; and, Table 7-1, Summary of Human Health and Ecological Risk Assessment.*** *The conceptual model discussed in Section 6.1 and presented in Figure 3 does not appear to support all the risk scenarios discussed in Table 7-1. As an example, Figure 3 does not show any receptor contact with subsurface soils. In another example, the consumption of beef, milk and fruits/vegetables are discussed in Table 7-1 as exposure routes that could affect residents, while Figure 3 does not show this exposure route. Figure 3 should be expanded to show all potential exposure routes, or it should be removed from the ROD to avoid confusing the reader.*

**Response:** Figure 3 will be removed from the ROD.

2. ***II - Decision Summary, Section 12, Selected Remedies, Pages 12-1 through 12-14.*** *Several of the "Summary of the Rational for the Selected Remedy" subsections in Section 12 include the statement "About implementability concern, institutional controls involve simple activities such as utilization of existing Indiana well permitting regulation and water quality monitoring." The exact meaning of this sentence is somewhat unclear. It is recommended that this sentence be revised in each of the applicable subsections to read something similar to: "Implementability should not be a concern since institutional controls involve simple activities such as utilization of existing Indiana well permitting regulation and water quality monitoring."*

**Response:** Comment will be incorporated as stated.

3. ***II - Decision Summary, Section 12.3.2, Detailed Description of the Selected Remedy (Sites 3/4), Page 12-2.*** *The first paragraph in this section, with respect to the soil excavation and off-site disposal remedy, states that “There would be no reduction in toxicity or volume with this alternative ...” However, excavation and off-site disposal should result in an overall reduction in toxicity and waste volume at JPG. This is supported by the column in Table 10-1 titled: “Reduction of Toxicity, Mobility, or Volume” and the column in Table 13-2 titled: “Reduction of Toxicity, Mobility, or Volume Through Treatment.” Revise the ROD to indicate that the selected remedy for Sites 3/4 is expected to result in a reduction in toxicity, mobility and volume.*

*This issue also applies to Section 12.10.2, which addresses the soil excavation and off-site disposal of soil from Sites 21A/30.*

**Response:** Sections 12.3.2 and 12.10.2 will be revised to indicate that the selected remedy, although it will not result in a reduction of toxicity or volume of contamination in soils, it will result in a reduction of toxicity and volume of contaminated soils remaining at JPG after the soil excavation activities are completed.

4. ***II - Decision Summary, Section 12.5, Sites 9/10 - Gate 19 Landfill and Burning Ground South of gate 19 Landfill, Page 12-5.*** *This section indicates that Sites 9 and 10 will not be transferred out of Army ownership, and will be incorporated into the current refuge system. The section also states that fencing currently restricts the site and the areas will not be transferred for public use. Based on this information, it is not completely clear how access to Sites 9 and 10 will be limited in the future, especially if the sites are incorporated into wildlife refuge land where there may be a lower level of trespasser oversight than is currently available. Revise the ROD to explain how access to Sites 9 and 10 will be restricted in the future (e.g., fence with warning signs and regular maintenance).*

**Response:** Access to Sites 9/10 is limited by the perimeter and east-west firing line fence (8 foot high chain link topped with 3-strand v-shaped barbed wire) currently in place at JPG. In addition to the fence, access to the area is controlled by the USFWS by a locked gate with restricted access to the key and as specified by the MOA between the Army, USFW and the Air Force for access control. To further limit access temporary barriers will be erected to limit access to the cap. Signs will be placed on the fence post indicating no trespassing, and or no hunting allowed. For areas not fenced, fence post will be erected and signage placed on the east, north and south sides of the landfill. The site will have semi-annual maintenance inspections.

5. ***II - Decision Summary, Section 13.1, Protection of Human Health and the Environment, Pages 13-1 and 13-2.*** *The ROD does not address all the land use control (LUC) criteria referenced in this section. The ROD should be revised to address the following issues:*

- A map showing the actual boundaries of the property that will be covered by the LUC should be included in the ROD. The map provided in Figure 2 provides no indication of the size of the site and its actual location. The ROD should be revised to include maps that show the boundaries of all properties that will be covered by LUCs.
- The expected duration of the LUCs for Sites 1, 2/27 and 9/10 are not described in the ROD. Revise the ROD to include this information.

In addition, a Land Use Control Implementation Plan (LUCIP) will need to be submitted to the U.S. EPA to document the procedures that will be followed in implementing the land use controls. Revise the ROD to state that a LUCIP will be submitted concurrently with the submittal of the Remedial Design (RD) work plan to U.S. EPA. The LUCIP can be included in the RD work plan, as opposed to submitting two separate documents.

**Response:** The LUCs for groundwater will be further identified in the Groundwater RD/RA Work Plan. A Soils Implementation Plan will be submitted as a separate document from the Soils RD/RA Work Plan for Sites 3/4, the New Burn Site, 14, 21A/30. The ROD text will be modified to say that the duration of the LUCs, the implementation, maintenance, the maps, and reporting of the LUC will be depicted in these documents. Per the Navy "Principles and Procedures for Specifying, Monitoring and Enforcement of Land Use Controls and Other Post-ROD Actions", a description of the site should be included in the ROD. The locations of the sites are indicated on Figure 2 and this reference will be added into the ROD text. More specific maps will be included in the Soils Implementation Plan and the Groundwater RD/RA Work Plan.

6. ***III - Community Participation Responsiveness Summary, Section 1.4, NFA Sites Need Further Characterization, Page RS-4.*** *For Site 31, the text states that "the human health risk assessment indicated that risks and hazards are at acceptable levels." However, Section 23.6.3.1.1 (Future On Site Residents) of the Final Remedial Investigation Report indicates that although no pathway-specific hazard index (HI) exceeds 1.0, the overall HI for a future on-site toddler resident is calculated to be 1.5 for exposure to surface soil and 1.3 for exposure to combined subsurface/surface soils. U.S. EPA's Risk Assessment Guidance for Superfund (RAGS) Volume I, Section 8.3.3 suggests that, "If the total hazard index exceeds unity and if combining exposure pathways has resulted in combining hazard indices based on different chemicals, one may need to consider segregating the contributions of the different chemicals according to major effect." Therefore, the major effects and*

*target organs or methods of action for each surface/subsurface soil chemical of potential concern (COPC) should be identified, and separate hazard indices should be derived for each group of COPCs that has the same target organ or method of action. If the HI for any of these groups exceeds 1.0, this indicates that the existing contamination at Site 31 may still present a chemical hazard to future on-site residents. Reevaluate the HI for noncarcinogenic effects at Site 31 based on COPCs which have the same target organ or method of action, as discussed above. In the revised evaluation, please consider how the rejection of antimony data may influence the resulting HIs. After this evaluation is completed, it should be summarized and used in support of proposed further actions or NFA at Site 31.*

**Response:** Within the RI, it was pointed out that the individual hazard quotients (HQ) that make up the hazard index (HI) of 1.5 or 1.3 were each less than one, and because of the conservative nature of the scenario, the HI of 1.5 or 1.3 was not considered a concern to a residential child. However, the additional evaluation that was requested has been performed. This type of analysis is optional, but is beneficial in this case to more clearly communicate that the level of risk is below that which would pose a health concern. The different effects of the two major chemicals (i.e., arsenic and manganese) contributing to the majority (i.e., greater than 80 %) of the HI of 1.5 or 1.3, each have different adverse health effects on the human body. While other COPCs were evaluated, their HQs were much less than one and did not contribute significantly to the overall HI. The toxicity endpoint that the arsenic toxicity value was based upon were skin effects, while the toxicity endpoint for manganese was based upon central nervous system effects. Considering this, the HIs based on different major toxic effects would be less than 1. Based on this additional analysis, which builds upon the original risk evaluation, noncancer type health effects would not be expected. Therefore, NFA status for Site 31 is appropriate.

7. **Table 8-1, Page 1, Site 1 and Sites 2/27.** *The initial sections of the table do not address the need to limit future residential exposures at Site 1 and Sites 2/27. Since deed restrictions will be placed on the properties, it is recommended that the table be revised to indicate that future residential exposures will be limited by placing deed restrictions on the properties.*

**Response:** Table 8-1 will be revised for Sites 1 and 2/27 to add, "Future residential exposure will be limited through placement of deed restrictions."

8. **Table 8-1, Page 1, Site 4.** *The section of the table addressing Site 4 does not list the U.S. EPA Region 9 Preliminary Remediation Goals (PRGs) proposed for the soils in the trench area and new burn site. Revise the table to list the specific Region 9 soil PRGs proposed for these areas of Site 4.*

**Response:** The PRGs for soils will be added to Table 8-1 for Site 4.

9. ***Tables 10-4 and 10-5, Sites 12A and 12B.*** The “rankings” for Alternative 3: Collection and Treatment” in the ROD for each of these sites differs from the rankings shown in the Feasibility Study (FS) and Proposed Plan. It appears that the rankings were reduced because it is “difficult to remove groundwater” at these sites. Since the ROD is based on the information presented in the FS and Proposed Plan, it is recommended that an explanation be included in the ROD as to why the rankings changed since the preparation of the FS and Proposed Plan. This can be placed in the footnotes of the tables or the text of Section 10.2.

**Response:** The Proposed Plan (PP) dated February 2004 has the same ranking number for Sites 12A and 12B that are given in the ROD. Tables 4 and 5 of the PP list a ranking of 50 for groundwater Alternative 3. Tables 10-4 and 10-5 of the ROD also give a ranking of 50 for groundwater Alternative 3.

The ranking was modified slightly after the FS. The public review, however, was performed based on the PP, and the ROD reflects the same rankings as in the PP.

10. ***Table 12-6, Cost Estimate Summary (Site 12C - GW RA).*** The operation and maintenance (O&M) costs for Site 12C have been determined based on a 20 year period. This is also discussed in Section 12.8.3 of the ROD. However, cost estimates for sites with similar contaminants (chlorinated solvent chemicals) are typically based on a 30 year period. Clarification should be provided in a footnote to Table 12-6 or the text of Section 12.8.3 to explain why only a 20-year period was used to establish O&M costs for Site 12C.

**Response:** A footnote will be added to Table 12-6 to indicate that the 20-year O&M period was based on the expectation that Site 12C will only require monitoring for a short period as supported by the decreasing levels of contamination since the source was removed in 2000. Monitoring results from 2001 indicate concentrations decreased by an order of magnitude from 1996 data. Since that time, the 2002 monitoring data indicated that concentrations decreased by another order of magnitude from the 2001 concentrations. Therefore, a shorter O&M period is warranted.

11. ***Table 12-10, Summary of Proposed Alternative Costs.*** This table contains valuable information regarding the total costs for all the remediation alternatives at JPG. However, it does not appear that the table is referenced within Section 12 of the text. Please provide a reference to this table within the text of Section 12.

**Response:** Section 12 will be revised to include a reference to Table 12-10

12. **Table 13-1, Description of ARARs for Selected Remedy, Page 1 of 3.** The “requirement citation” for the Federal Drinking Water Regulation appears to include the incorrect 40 CFR citation. The Federal Drinking Water maximum contaminant levels (MCLs) are listed as being in 40 CFR Parts 122 and 125. However, the MCLs are contained in 40 CFR Part 141. Revise Table 13-1 to provide the correct requirement citation.

**Response:** Table 13-1 will be revised with the correct citation.

13. **Table 13-1 Description of ARARs for Selected Remedy, Page 2 of 3 and 3 of 3.** The “Federal Transport of Hazardous Waste,” “Federal RCRA Land Disposal Restrictions” and “Indiana Hazardous Waste Law” regulations are identified as “not applicable” because “Soils at JPG are not hazardous.” However, an earlier section of the table states “The soils at JPG will be characterized prior to disposal. Based on RI data, it is expected that soils will not be classified as a hazardous waste.” Since the soils still require characterization, it is recommended that the Federal Transport of Hazardous Waste, Federal RCRA Land Disposal Restrictions and Indiana Hazardous Waste Law applicability descriptions be revised to read: “Based on RI data, it is expected that soils will not be classified as a hazardous waste, therefore, these regulations may not be applicable.”

**Response:** Table 13-1 will be revised to say “based on the RI data, it is expected that soils will not be classified as hazardous waste, therefore these regulations may not be applicable.”

14. **Table 13-1 Description of ARARs for Selected Remedy, Page 2 of 3.** The last row on Page 2 of 3 of the table lists U.S. EPA Region 9 Soil PRGs as Applicable or Relevant and Appropriate Requirements (ARARs). However, ARARs are promulgated standards or laws. It is recommended that the Region 9 PRGs be identified as To Be Considered (TBCs) for this ROD.

**Response:** The USEPA Region 9 Soil PRGs will be identified as a TBC in Table 13-1.

15. **Table 13-1 Description of ARARs for Selected Remedy, Page 1 of 3 through 3 of 3.** The Indiana Groundwater Protection Act (Indiana Code, Title 13, Article 7, Chapter 26) is listed in the FS as a potential ARAR. It is unclear why this regulation has been omitted from the ROD, as State of Indiana groundwater regulations would appear to be ARARs for the groundwater remedies. Please review this regulation for potential inclusion as an ARAR in the ROD.

*In addition, the Indiana Hazardous Waste Management Rules (Indiana Administrative Code, Title 329, Article 3.1) are listed in the FS as a potential ARAR.*

*It is unclear why these regulations have been omitted from the ROD, as the soils to be excavated have not been completely characterized. Please review these regulations for potential inclusion as ARARs in the ROD.*

**Response:** These state regulations are not considered to be more stringent than the federal regulations and therefore are not required to be on the ARARs table.

**Summary of U.S. EPA's Evaluation of NFA Recommendations in the ROD  
Dated May 2004  
Jefferson Proving Ground  
Madison, Indiana**

Site Number	Site Name	No Further Action (NFA) Evaluation	Comments
8	Building 295 Small Arms Firing Range	Deed Restriction recommended, restricting children and pregnant women from the premises.	Confirmation soil sampling results for inside of the building were not included in the Final RI Report. Results are present in the "Technical Memorandum, No Further Remedial Action is Planned at Site 8," dated April 2000. U.S. EPA Region 5 concurred with the findings in the Tech Memo and recommends restricting children and pregnant women from the premises, due to the fact the building contained lead and other metals contamination.
11	Burning Area for Explosive Residue	Agree with NFA recommendation in ROD	This site appears to be the Burning Area that is being addressed under the 1998 RCRA Closure Plan. A Final Soil And Groundwater Analysis Summary Report, Preclosure of the Open Burning Area document was submitted to U.S. EPA in January 2003 and is being addressed under RCRA.
13	Old Fire Training Pit	Agree with NFA recommendation in ROD	No Comments
15	Burn Area South of New Incinerator	Agree with NFA recommendation in ROD	No Comments
16	Potential Ammo Dump Site	Agree with NFA recommendation in ROD	U.S. EPA reviewed the 2001 UXO Removal Action Report, 1995 Tech Memo for Site 16 and 2003 FOST for the Western Wooded Area Parcel. U.S. EPA concurred with the Western Wooded Parcel FOST determination in October 2003.

Site Number	Site Name	No Further Action (NFA) Evaluation	Comments
17	Asbestos-Containing Materials (ACM)	Agree with NFA recommendation in ROD	A December 1995 Response to Comments indicates that NFA for CERCLA related activities is appropriate. However, Table 5-1 of the ROD and other available files indicate that ACM corrective action may still be in process under TSCA.
20A	Building 279 Temporary Storage Area	Agree with NFA recommendation in ROD	The September 1995 Technical Memorandum and December 1995 Response to U.S. EPA Comments indicate RCRA closure of the site is complete.
20B	Building 305 Temporary Waste Storage Area	Agree with NFA recommendation in ROD	The September 1995 Technical Memorandum and December 1995 Response to U.S. EPA Comments indicate RCRA closure of the site is complete.
22	Building 216 Locomotive Maintenance Pit	Agree with NFA recommendation in ROD	No Comments
23	Potential Solvent Pit	Agree with NFA recommendation in ROD	No Comments
24	Soil Staging Area at Building 602	Agree with NFA recommendation in ROD	No Comments
25	Papermill Road Disposal Area	Agree with NFA recommendation in ROD	Confirmatory samples are documented in a September 1999 Memorandum. U.S. EPA approved the additional soil removal done at this site and the FOST for Papermill Road Parcel (Sites 25 and 26). The Restoration Advisory Board (RAB) recommended "no residential/agricultural development" in the review of the Draft Final Phase II RI Report, due to the appearance of stunted corn growth planted by the property's lessee/owner. The Army may want to consider this RAB recommendation for institutional controls/deed restrictions at Site 25.
26	DRMO Storage Area	Agree with NFA recommendation in ROD	No Comments
28, 29, 39	Gator Z Open Burn Area, Gator Z Mine Test Area, Gator Z Mine Scrap Disposal Area	Agree with NFA recommendation in ROD	Outstanding issues related to ecological risk assessment were resolved during a July 29-31, 2003 comment resolution meeting.

Site Number	Site Name	No Further Action (NFA) Evaluation	Comments
31	Building 227 Former Storage Pad	Do not agree with NFA recommendation in ROD	Section 23.6.3.1.1 of the Final Phase II RI Report, indicates that the overall hazard index exceeds 1.0 for the future on-site toddler scenario. U.S. EPA requested additional information related to the risks/hazards posed by this site in the enclosed deliverable (See above Specific Comment #6).
33	Building 333 New Incinerator	Agree with NFA recommendation in ROD	The RAB recommended "no residential/agricultural development" in the review of the Draft Final Phase II RI Report due to reported levels of dioxins/furans.
34	Building 136 Sandblasting Area	Agree with NFA recommendation in ROD	No Comments
38	Northwest-Southwest Runway Flare Test Area	Agree with NFA recommendation in ROD	No Comments
42	Building 281 Indoor Range	Deed Restriction recommended, restricting children and pregnant women from the premises.	U.S. EPA Region 5 concurred with the findings in the Tech Memo and recommends restricting children and pregnant women from the premises, due to the fact the building contained lead contamination.
45, 46, 47	Various UXO Sites	Institutional Controls, Deed Restrictions and/or access control restricting agricultural and residential reuse is recommended.	U.S. EPA reviewed and did not approve the referenced December 1995 Technical Memorandum, 2002 UXO Residual Soil Testing tech Memo and Airport FOST; recommends placing institutional controls, deed restrictions and/or access restrictions on these sites to restrict residential and agricultural reuse.
49	Possible Explosive Ordnance South of the Firing Line	Institutional Controls, Deed Restrictions and/or access control restricting agricultural and residential reuse is recommended.	U.S. EPA reviewed and did not approve the referenced December 1995 Technical Memorandum, 2002 UXO Residual Soil Testing Tech Memo and Airport FOST; recommends placing institutional controls, deed restrictions and/or access restrictions on these sites to restrict residential and agricultural reuse.
18, 19, 35, 36, 37, 40, 41, 44	Various UST Sites	Agree with NFA recommendation in ROD	The ROD indicates all USTs received IDEM approval for UST closure. U.S. EPA believes the underground concrete vault should be regulated by the State and not under CERCLA.

Site Number	Site Name	No Further Action (NFA) Evaluation	Comments
32, 43, 50	Various Sites	Agree with NFA recommendation in ROD	No Comments
48	Ammo Storage Igloos S of FL	Institutional Controls, Deed Restrictions and/or access control recommended.	U.S. EPA reviewed and provided comments in October/November 1995 on the September 1995 Technical Memorandum for review, and visually inspected each igloo with the Army, IDEM and Nuclear Regulatory Commission (NRC). Because the igloos used to store ammunition, depleted uranium, etc., U.S. EPA recommends placing institutional controls, deed and/or access restrictions on these site locations; specifically restricting children and pregnant women from the premises, residential and agricultural reuse.

**Response Regarding the Above Table:** The USEPA indicates they do not agree with NFA for Sites 8, 31, 42, 45, 46, 47, 48, 49, and recommend institutional controls be proposed for these sites. The Army does not agree with that recommendation based on the following:

- For Sites 45, 46, 47, and 49, refer to the response to Comment #3. The UXO soil samples were composited only within each BIP location as stated in the response. These locations were very small and soils were not mixed among the different BIP locations. The use of LCG was included in the JPG QAPP and was approved for use by USEPA. In addition, only minor, if any, changes would occur if the data were reviewed using a different version of the LCG.
- Regarding Site 8 and Site 42, the USEPA is basing their recommendation on the former presence of lead in the buildings. Site 42 is located North of the Firing Line and therefore will not be transferred out of Army control, therefore future use is already controlled. Site 8 underwent a remedial action in 1997 as described in the Final RI. Contaminated soils within Building 295 were removed, lead dust removal was performed, and the walls and floors were sprayed with Lead Barrier Compound and an encapsulating epoxy. Confirmation data verifying that the remedial action was successful are in the *Technical Memorandum, No Further Remedial Action is Planned at Site 8*, dated April 2000. Therefore no restrictive use will be placed on Site 8
- For Site 31, refer to the response to Comment #9 above.

- For Site 48, there is no evidence that a release occurred and the potential for a release was determined to be low. A Tech Memo was prepared in September 1995 and responses to agency comments were submitted in January 1996. A Letter date May 8, 1996 from the NRC to the Army provides for unrestricted use of the property south of the firing line with regards to radiological concerns. Based on the type of munitions and the release from NRC the Army finds no reason to limit the use of the igloos (Site 48). No restrictive covenants will be placed with the igloos.

For these reasons, the Army continues to support and propose NFA for Sites 8, 42, 45, 46, 47, 49, 31, and 48, and requests the USEPA consider this information in evaluating the need for institutional controls

**A2**

**SEPTEMBER 2, 2004 MWH E-MAIL**

**Bruce A Iverson**

09/02/2004 03:14 PM

To: Mason-Smith.Karen@epamail.epa.gov, KHERRON@dem.state.in.us  
cc: todd.beckwith@us.army.mil, paul.d.cloud@us.army.mil,  
Andrew.B.Evens@lrl02.usace.army.mil, "Leslie Busse"  
<lbusse@bt2inc.com>

Subject: JPG Draft Final ROD: Response to USEPA Comments 

Karen

On behalf of the Army, attached are the Army's responses to USEPA comments on the Draft Final ROD for JPG. Thanks, Bruce 608-231-4747



66 RTC for RTC for USEPA on the DF ROD  
Mason-Smith.Karen@epamail.epa.gov



**Mason-Smith.Karen@epamail.epa.gov**

08/16/2004 06:44 PM

To: pdcloud@sbccom.apgea.army.mil,  
Andrew.B.Evens@lrl02.usace.army.mil  
cc: Kherron@dem.state.in.us, RJYoung@techlawinc.com,  
phill@venus.net, bruce.a.iverson@us.mwhglobal.com,  
dhenshel@indiana.edu, rhill@ivytech.edu, jadewitt@indiana.edu  
Subject: USEPA Cmnts on JPG's RTCs on DF ROD

Attached are USEPA's comments on the Army's response to comments (RTCs) for JPG's DF ROD. I can be contacted at (312) 886-6150, if you have any questions.

Thanks,  
Karen

## RESPONSES TO USEPA COMMENTS

### Draft-Final Record Of Decision

For Sites 1, 2/27, 3/4, 7/21b, 9/10, 12a, 12b, 12c, 14, and 21a/30, and  
No Further Action Sites 8, 11, 13, 15 to 19, 20a, 20b, 22 to 26, 28, 29, and 31 to 50  
Dated July 2004

Jefferson Proving Ground  
Madison, Indiana

Following are the Army's response to USEPA comments presented in the USEPA letter dated August 16, 2004 associated with the Draft-Final Record of Decision for Sites 1, 2/27, 3/4, 7/21B, 9/10, 12A, 12B, 12C, 14 and 21A/30 and No Further Action Sites 8, 11, 13, 15 to 19, 20A, 20B, 22 to 26, 28, 29, and 31 to 50 (ROD) dated July 2004 at Jefferson Proving Ground (JPG). The following numbering system corresponds to the numbers used in the letter.

### GENERAL COMMENTS

1. *This response appears partially adequate. With respect to the first bullet item in the response, it appears that the additional well replacements referenced in the original U.S. EPA comment have been completed (two additional till/loess interface wells at Site 12A, three additional till/loess interface wells and one additional till/bedrock well at Site 12B). With respect to the second bullet item, U.S. EPA did not receive the pdf version of the Final Proposed Plan referenced in the cover letter for the ROD. However, major discrepancies exist between cost estimates presented in tables in the Draft-Final Proposed Plan (dated January 27, 2004) and the ROD. For example, the cost referenced in Table 2 of the Draft-Final Proposed Plan for Sites 3/4 is \$521,000, while the cost shown in Table 12-2 (and Table 10-2) of the ROD is \$880,000. There are similar discrepancies between other Proposed Plan and ROD tables. If similar discrepancies exist between the Final Proposed Plan and ROD, it is recommended that the differences be explained in the ROD.*

**Response:** There are no discrepancies between the Tables in the Final Proposed Plan dated February 18, 2004 and the ROD. There was a discrepancy in the Draft-Final Proposed Plan but these were corrected in the Final Plan. A hard copy of the Final Proposed Plan dated February 18, 2004 was submitted to the USEPA. A CD containing a pdf of the Final Proposed Plan was submitted in a letter dated February 19, 2004. Another CD will be sent to the USEPA.

3. *This response appears inadequate. The response states that "the results of the sampling indicated that the soils left after UXO was blown in place do not represent a source of contamination." The response also indicates that two craters had chemicals*

*present at concentrations exceeding U.S. EPA Region 9 Preliminary Remediation Goals (PRGs) and that the craters were only two feet in diameter. Therefore, it is concluded in the response that the craters pose very little potential for human or ecological receptor exposures. However, it appears from the response that the soil samples were collected from multiple 0-12 inch intervals within the blown-in-place (BIP) craters. It would appear that compositing (homogenizing) soils from multiple 0 to 12 inch intervals would result in significant dilution of any chemicals potentially present at the surface within the BIP crater. In addition, the number of BIP craters that were sampled compared to the total number of BIP craters present in the SE and NE Parcels is not clear from the response. Describing the number of craters sampled and the number of craters present would provide an indication of the potential extent of contamination. Concurrence with the no further action (NFA) recommendation cannot be achieved until adequate data are submitted to U.S. EPA by the Army that show whether residual contamination exists in the surficial soils in and around the BIP craters, and the extent to which this contamination does/does not exist. Additional explanation of soil compositing procedures and percentages of BIP craters sampled in the SE and NE Parcels is needed to justify that adequate data have been collected. Alternatively, additional contaminant characterization, institutional controls, deed restrictions and/or access restrictions appear warranted.*

*Also, in order for the Appendix D: Quality Control Summary Report in the JPG Final Tech Memo for UXO Testing of the NE and SE Parcels to be considered acceptable, data will need to be validated based on the most current version (i.e., 5.0) of the Louisville Chemical Guidelines (LCG).*

**Response:** For samples identified as being collected from BIP craters, plastic (i.e., vis-queen) was present in the BIP craters at the time of soil sampling, and some of the craters contained water. After the water had been removed from the crater and the plastic peeled back to expose the crater sidewall, the soil samples were collected by scraping the crater sidewall from just below the crater bottom to the ground surface. Thus, the soil samples from the 0 (ground surface) to 12-in (just below the crater base) depth interval represented the soils most likely impacted by the detonation of the UXO. The depth of the crater was determined in the field with IDEM and the USACE to be the best indicator of contamination. Because only soils from the crater sidewall were used in the composite sample for a particular BIP location and these soils are most representative of impacts from the detonation of UXO, the possibility of sample dilution by excess soil collection is unlikely.

Ten samples were collected in the Northeast Parcel and 46 samples were collected in the Southeast Parcel, as described in the Work Plan that was reviewed and approved by IDEM. Eight of the ten samples taken in the Northeast Parcel along Woodfill Road were directly from BIP craters. All known BIP craters along Woodfill Road were sampled.

The 46 samples collected at the Southeast Parcel are as follows:

- 30 soil boring (SB) samples were collected from borings in the 8-acre area previously excavated and screened to gather UXO for disposal. The entire 8-acre area was excavated to a depth of 4 ft, screened to remove UXO, and the soil returned back to the excavation. 28 of the 30 soil borings were conducted from the ground surface to the excavated depth of 4 ft, and the resulting soil sample was composited (homogenized) for that location and a aliquot collected for laboratory analyses. Considering the soil from the entire 8-acre parcel was excavated, screened, and returned to a depth of 4 ft, the soil boring samples were already well homogenized. The two remaining soil borings were conducted to a depth of 2 ft at the two UXO detonation trenches identified in the 8-acre parcel. The overall distribution of soil borings across the 8-acre parcel was determined in the field by USACE and IDEM based on the quantity of UXO removed from each grid contained in the 8-acre parcel. The grids with the greatest quantity of UXO removed had the most soil boring samples collected. Thus, the screened soil in the 8-acre parcel was thoroughly characterized.
- Four surface soil (SS) samples were added to the scope to assess potential impacts from the mortar firing launch area. These locations were determined in the field by USACE and IDEM based on mortar firing location, firing direction, and prevailing wind direction.
- Twelve surface soil (SS) samples were collected outside the 8-acre parcel to evaluate grids where BIP locations had been identified. In each of the twelve BIP grids to be sampled, a thorough search was made by MWH, USACE, and IDEM to identify the BIP locations. Four of the twelve BIP grids did not have any observable evidence of a BIP location, and therefore a surface soil sample was not collected from that grid. Five of the BIP grids had all 6 identified BIP craters sampled. Three BIP grids together had a total of 9 BIP locations identified of which five BIP craters were sampled. Overall, 10 BIP craters were sampled to represent the total 17 BIP craters identified. Thus, 100% of the identified BIP craters were sampled in 9 of the 12 BIP grids, and approximately 50% of the identified BIP locations were sampled in the remaining three BIP grids.

Of those samples, only one in each area detected analytes above USEPA Region 9 Residential PRGs. Specifically, at the Northeast Parcel, manganese, iron, and arsenic exceeded the Region 9 Residential PRG, and at the Southeast Parcel, explosives, iron, and arsenic exceeded the Region 9 Residential PRG. However, as reported in the report titled "Final Technical Memorandum, UXO Soil Testing for the NE and SE Parcels" by MWH dated August 2002, these exceedances would not represent a concern because they represent very small areas to which human health and ecological receptors would have very little potential to be exposed. IDEM approved this report in a letter dated August 7, 2002. These were each found in an approximate

2-ft BIP area, in comparison to the total area of the Northeast and Southeast parcels of approximately 440 acres and 800 acres, respectively.

The UXO sampling data will not be re-validated using the current version 5 of the LCG. This was done in the past for other samples and the changes were minor, usually favoring the Army and not having any impact on data quality. The data were validated using the current LCG at the time of sampling according to the approved QAPP, and is appropriate. Work was completed according to the QAPP, which was reviewed and approved by USACE, IDEM, and the USEPA.

Based on these responses, it is the Army's opinion that a revision to the ROD is not required.

## **SPECIFIC COMMENTS**

4. ***II - Decision Summary, Section 12.5, Sites 9/10 - Gate 19 Landfill and Burning Ground South of gate 19 Landfill, Page 12-5:*** *This response appears adequate. However, ensure that this access restriction information is included in the final version of the ROD.*

**Response:** This information will be added to Section 12.5 of the Final ROD.

6. ***III - Community Participation Responsiveness Summary, Section 1.4, NFA Sites Need Further Characterization, Page RS-4.*** *The response appears to be partially adequate. The response adequately addresses the potential cumulative effects of arsenic and manganese on the total hazard index (HI). However, the comment also requested that the Army consider how the rejection of antimony data might influence the resulting HIs, and the response does not address this issue. According to U.S. EPA's Integrated Risk Information System (IRIS), potentially adverse effects from exposure to arsenic, manganese and antimony would be expected to affect different target organs. Therefore, the exclusion of antimony data from the risk assessment is not expected to significantly affect the total HI (assuming antimony by itself will not result in adverse impacts on human health). Although the Army did not provide a complete response to the original comment, no further action appears necessary.*

**Response:** This comment refers to Site 31. No response is required as indicated by the last sentence in the comment above. However, it should be noted that because metals of concern like lead and cadmium were not detected at levels above USEPA Region 9 PRGs, it is not likely that antimony would have been detected at elevated concentrations at Site 31 because antimony is typically used as an alloy.

9. ***Tables 10-4 and 10-5, Sites 12A and 12B.*** U.S. EPA did not receive the pdf version of the Final Proposed Plan referenced in the cover letter for the ROD. However, comparing the tables referenced in the response between the Draft-Final Proposed Plan and the ROD indicates discrepancies between the rankings for Sites 12A and 12B. The rankings in the ROD for Sites 12A and 12B are 50, while the rankings in the Draft-Final Proposed Plan are 54. If similar discrepancies exist between the Final Proposed Plan and ROD, it is recommended that the differences be explained in the ROD.

**Response:** There are no discrepancies between the tables in the Final Proposed Plan and the ROD. A hard copy of the Final Proposed Plan dated February 18, 2004 was submitted to the USEPA. A CD containing a pdf of the Final Proposed Plan was submitted in a letter dated February 19, 2004. Another CD will be sent to the USEPA.

***Response Regarding the Above Table.*** Please see U.S. EPA's above evaluation of the Army's Response to General Comment 3.

**Response:** See Response to General Comment 3.

## **APPENDIX B**

### **IDEM COMMENTS AND RESPONSE TO COMMENTS N DRAFT FINAL ROD**

B1	June 30, 2004 USACE E-Mail
B2	July 14, 2004 IDEM E-Mail
B3	October 20, 2004 USACE E-Mail

**B1**

**June 30, 2004 USACE E-Mail**

**From:** Evens, Andrew B LRL02

**Sent:** Wednesday, June 30, 2004 12:32 PM

**To:** 'KEVIN HERRON'; 'Mason-Smith.Karen@epamail.epa.gov'; 'Cloud, Paul D RDECOM'; 'Beckwith, Todd T USAEC'

**Subject:** RE: Response to IDEM comments of ROD

Forgot to attached the responses, sorry :-p

-----Original Message-----

**From:** Evens, Andrew B LRL02

**Sent:** Wednesday, June 30, 2004 12:31 PM

**To:** 'KEVIN HERRON'; 'Mason-Smith.Karen@epamail.epa.gov'; 'Cloud, Paul D RDECOM'; 'Beckwith, Todd T USAEC'

**Subject:** Response to IDEM comments of ROD

All, attached are the Army responses to IDEM comments on the ROD. We should have EPA response to comments out today or tomorrow.

We are looking for a Date of July 15<sup>th</sup> for IDEM to respond to responses and settle any issues that might need to be discussed.

Thanks Brooks

Also it looks like the Soil Remedial Design will be coming out next week. We are targeting the



middle of September 2004 to start remedial activities. 67 IDEM Resp to Comm DF ROD.

**RESPONSES TO IDEM COMMENTS  
DATED MAY 26, 2004**

**Draft-Final Record of Decision (ROD)  
Dated May 2004  
Jefferson Proving Ground  
Madison, Indiana**

Following are the Army's response to comments presented in the Indiana Department of Environmental Management (IDEM) e-mail from Kevin Herron dated May 26, 2004 associated with the Draft-Final Record of Decision (ROD) dated May 2004 for the Jefferson Proving Ground in Madison, Indiana. The following numbering system corresponds to the numbers used in the IDEM e-mail.

1. *On Page D-1, for Site 1 Soils and Sites 2/27 Soils, the Recommended RA (remedial action) is listed as Deed Restrictions. Deed and land use restrictions are institutional controls. Institutional controls should be identified as the recommended RA.*

**Response:** For Site 1 and Sites 2/27, page D-1 will be revised as "Institutional Controls to Restrict Residential Use" for the recommended RA.

2. *On Page D-2, under the paragraph titled Limited Action (Institutional Controls and Monitoring), the following sentence should be included. "The development of the specific deed and/or land use restrictions and the groundwater monitoring frequency will be determined during the remedial design (RD) phase with participation by the BRAC Cleanup Team (BCT)."*

**Response:** Comment will be incorporated as stated.

3. *On Page D-2, under the paragraph titled Excavation and Off-Site Disposal, the following sentence should be included. "Confirmation sampling will be determined during the RD phase with participation by the BCT."*

**Response:** Comment will be incorporated as stated.

4. *On Page D-2, in the last sentence, the paraphrase "or will be" should be replaced with "and will continue to be."*

**Response:** Comment will be incorporated.

5. *On Page 6-1, in Section 6.1, in the second paragraph, the last sentence would be more accurate by stating, "Access to the facility is still primarily limited to the main gate."*

**Response:** The last two sentences in the second paragraph of Section 6.1 were deleted as a result of Paul Cloud's comments.

6. *On Page 6-2, for Sites 9/10, a statement under the future land use should be added indicating that historic and current access restrictions will be maintained indefinitely.*

**Response:** A sentence will be added for Sites 9/10 on Page 6-2, stating "Current access restrictions will be maintained indefinitely". In Accordance with the MOA signed by The Army, Air National Guard and US fish and Wildlife Service

7. *On Page 9-3, in Section 9.5, in the second paragraph, the paraphrase "and restricted access will be maintained" should be added to the last sentence.*

**Response:** Comment will be incorporated as stated.

8. *On Page 12-4. In Section 12.4.2, the eighth sentence is inaccurate to state a waiver of ARARs would be necessary if monitoring determined arsenic to be naturally occurring. There would be no statutory requirement to remediate naturally occurring substances or elements. A statement indicating that naturally occurring arsenic may be present above a drinking water standard, but there is no statutory requirement to remediate.*

**Response:** The eighth sentence in Section 12.4.2 will be revised to say, "However, the occurrence of arsenic may be determined through monitoring to be naturally occurring, in which case there is no statutory requirement to remediate the groundwater for arsenic."

9. *On Page 12-11, in Section 12.9.2, in the second paragraph, similar language for a waiver of ARARs as in comment 8 above is stated. Address it the same as in comment 8 above.*

**Response:** Comment will be addressed as indicated in the response to comment 8.

**B2**

**July 14, 2004 IDEM E-Mail**



"Evens, Andrew B  
LRL02"  
<Andrew.B.Evens@lrl02.usace.army.mil>

To: Bruce A Iverson <Bruce.A.Iverson@us.mwhglobal.com>  
cc:  
Subject: FW: Response to IDEM comments of ROD (acceptable)

09/03/2004 08:52 AM

Bruce, here is Kevin's concurrence with the RTC for the ROD.

-----Original Message-----

From: KEVIN HERRON [mailto:KHERRON@dem.state.in.us]

Sent: Wednesday, July 14, 2004 2:09 PM

To: Mason-Smith.Karen@epamail.epa.gov; Evens, Andrew B; paul.d.cloud@us.army.mil;  
todd.beckwith@us.army.mil

Cc: KEVIN HERRON

Subject: RE: Response to IDEM comments of ROD (acceptable)

The Army has adequately addressed IDEM staff comments on the Draft Record of Decision.

>>> "Evens, Andrew B LRL02" <Andrew.B.Evens@lrl02.usace.army.mil> 06/30/2004 11:32:20 AM >>>

Forgot to attached the responses, sorry :-p

-----Original Message-----

From: Evens, Andrew B LRL02

Sent: Wednesday, June 30, 2004 12:31 PM

To: 'KEVIN HERRON'; 'Mason-Smith.Karen@epamail.epa.gov'; 'Cloud, Paul D  
RDECOM'; 'Beckwith, Todd T USAEC'

Subject: Response to IDEM comments of ROD

All, attached are the Army responses to IDEM comments on the ROD. We should have EPA response to comments out today or tomorrow.

We are looking for a Date of July 15th for IDEM to respond to responses and settle any issues that might need to be discussed.

Thanks Brooks

Also it looks like the Soil Remedial Design will be coming out next week.  
We are targeting the middle of September 2004 to start remedial activities.

20P2-End

**B3**

**October 20, 2004 USACE E-Mail**



"Evens, Andrew B  
LRL02"  
<Andrew.B.Evens@lrl0  
2.usace.army.mil>

10/20/2004 09:22 AM

To: 'KEVIN HERRON' <KHERRON@dem.state.in.us>,  
Mason-Smith.Karen@epamail.epa.gov  
cc: "Paul Cloud (E-mail)" <paul.d.cloud@us.army.mil>, "Beckwith, Todd T  
USAEC" <todd.beckwith@us.army.mil>, 'Bruce A Iverson'  
<Bruce.A.Iverson@us.mwhglobal.com>  
Subject: Jefferson Proving Ground ROD and comments

Karen and Kevin, attached are response to additional comment from IDEM on the September 9<sup>th</sup> Red-line version of the ROD, and comments from more Army agencies. This is to help you complete your files.

The Army is waiting on two more agencies to comment and then a final version will be issued for signature by next week.

Also, the Army has given the notice to proceed with RA actions for JPG beginning the week of November 15<sup>th</sup>, 2004. This is in response to the RIP date of September 2005. The Army will try to complete this effort before the weather turns for the worst. The tentative schedule is for the Army to do RA actions at the Yellow Sulfur area and the Pesticide building, break for the Thanksgiving holiday and then move over to site 3 and 4 beginning November 29<sup>th</sup>. It is anticipated that this effort will take up to the Christmas break.

The RD for the Long Term monitoring should be shipped by the first week of November for your review. Out target date is to begin the LTM in December and at the latest after Christmas break in January.



Brooks 63\_ IDEM Resp to Comm DF ROD.d 62\_ESOH Resp to Comments ROD (unclassified)



64\_ROD Review Comments Dr Goldblum.c

## RESPONSES TO IDEM COMMENTS

### Draft Final ROD Jefferson Proving Ground Madison, Indiana

Following are the Army's response to IDEM comments presented in the IDEM e-mail dated October 1, 2004 associated with the revised Draft Final Record of Decision (redlined version) for Jefferson Proving Ground. The revised ROD was submitted to IDEM by MWH in an e-mail dated September 9, 2004. The following numbering system corresponds to the numbers used in the e-mail.

1. *Page 5-4, if you are going to add "under IDEM" in blue text, then you should also add "Solid Waste regulations and approved closure plans" with it.*

**Response:** Comment incorporated as stated.

2. *Page 9-1, concerning the addition language for EPA General Comment #2 on LUC and Five-Year Review. It should be made clear that a Five-Year Review will be performed every five years as long as contamination exists on site that prevents unrestricted access or reuse. It should also be addressed in all locations that discuss this same EPA comment. Possibly a global statement could be added and referenced as needed.*

**Response:** A global addition has been made to clarify that the five-year review will be performed as long as contamination exists to prevent unrestricted use of the site.

3. *Page 9-2, under Groundwater Alternative 2 for Sites 3/4, the statement change concerning the sampling for Chromium VI (NCR #22) sounds very awkward and would sound better if written as, "Additional monitoring for Chromium will be added if it is determined that Chromium VI is present, otherwise Chromium monitoring will be discontinued."*

**Response:** Comment incorporated as stated.

4. *Page 9-6, in Section 9.9 the second sentence is now awkward and confusing. The sentence may sound better if written, "... to complete the previous removal action and remove a potential source for groundwater contamination."*

**Response:** Comment incorporated as stated.

5. *On Page 10-2, Section 10.2, under the recommended alternative for Site 14 Soil, the Army should consider using either the word "enhance" or "complete" instead of the word "continue."*

**Response:** The sentence has been modified to say "...to complete the removal action".

6. *On Page 12-2, Section 12.3.2, confirmation soil samples being average is unacceptable. A previous email has been submitted addressing this issue. This comment is universal for the entire document (including, but limited to, Section 12.10.2).*

**Response:** The text has been modified per our agreed upon approach. Additional text is as follows:

"Confirmation soil sample results will be averaged. The average will be compared to USEPA Region 9 residential PRGs to assess if remedial action objectives are met. If the average is less than USEPA Region 9 residential PRGs, AND all individual confirmation sample results are less than 5 times the USEPA Region 9 residential PRGs, then the cleanup goals will be considered to be met. If the average is greater than the USEPA Region 9 residential PRGs, OR a single confirmation sample result is greater than 5 times the USEPA Region 9 residential PRGs, then additional remediation will be required. The details of how confirmation sampling will be performed and how the results will be interpreted will be described in the Soils RD/RA Work Plan."

This text has also been added to Sections 12.9.2 (Site 14) and 12.10.2 (Sites 21A/30) for evaluation of confirmation sampling.

7. *Page 12-4, Section 12.4, the new blue paragraph, instead of stating that "... the methodology for address when monitoring can be terminated," IDEM still believe that it should state that "... the steps and documentation necessary to determine whether monitoring can be terminated."*

**Response:** Comment incorporated as stated.

8. *Page 12-8, Section 12.7, the new blue paragraph, the last sentence should read, "The steps and documentation necessary to determine whether groundwater monitoring can be terminated will be addressed ...".*

**Response:** Comment incorporated as stated.

9. *Page 12-10, Section 12.8, see comment immediately above concerning Section 12.7.*

**Response:** Comment incorporated as stated.

10. *Page 12-12, Section 12.9.2, second paragraph, the statement to address IDEM comment #9, the word "not" should be changed to "no" or the word "a" should be added after the word.*

**Response:** Comment incorporated, the word "not" has been changed to "no".

11. *Page 13-2, Section 13.1, item 5., the Army needs to address/state how they will assure that new property owners will enforce LUCs.*

**Response:** Per the Navy Principles discussed earlier in Section 13.1, implementation details such as this will be discussed in the Groundwater RD/RA Work Plan and/or the Soils LUC RD/RA Work Plan, rather than in the ROD. Therefore, revisions to the ROD will not be made to address this comment.

12. *Page 13-4, Section 13.6, it needs to be noted that a 5-year review will be conducted as long as contamination remains on site that prevents unlimited/unrestricted use and unrestricted "access" for the site(s). It would be "that prevents unacceptable exposure." The presentation of "a" **Five-Year Review** is incorrect unless contaminant concentration drop below levels that would allow for unrestricted use or unrestricted access to the sites after a single occurrence.*

**Response:** Section 13.6 has been revised to indicate that the Five-Year Reviews will be performed as long as contamination exists that prevents unlimited use of the sites.

## **APPENDIX C**

### **BRACO COMMENTS AND RESPONSES TO COMMENTS ON DRAFT FINAL ROD**

- C1     October 15, 2004 Response to Comments
- C2     October 15, 2004 BRACO E-Mail

**C1**

**October 15, 2004 Response to Comments**

## RESPONSES TO DR. DAVID GOLDBLUM COMMENTS

### Record of Decision (ROD) Jefferson Proving Madison, Indiana

Following are the Army's response to Dr. David K. Goldblum's, BRAC Division, comments presented in the e-mail from Todd Beckwith of AEC dated September 24, 2004 associated with the Final Record of Decision (ROD) for the Jefferson Proving Ground in Madison, Indiana. The following numbering system corresponds to the numbers used in the e-mail.

Jefferson Proving Ground ROD Review Comments:

#### A. Table of Contents:

1. *On page i, the page number for the Decision Summary needs to be revised from the noted D-2 to 1-1.*

**Response:** Comment incorporated as stated.

2. *On page i, on the line for Section 5.3, delete the comma after "Abandoned Landfill".*

**Response:** Comment incorporated as stated.

3. *On page iii, the page number for the Community Participation Responsiveness Summary needs to be revised from the noted D-3 to RS-1.*

**Response:** Comment incorporated as stated.

4. *On page iii, the final line of this page should read as "3. USEPA AND IDEM COMMENTS ON DRAFT FINAL ROD.....RS-6".*

**Response:** Comment incorporated as stated.

5. *On page iv, should the Table 13-1 line read as "Description of ARARs and TBCs for Soils RA"? Please reconcile this inconsistency.*

**Response:** The heading on Table 13-1 will be revised to say “Description of ARARs and TBCs for Selected Remedy”.

**B. List of Acronyms:**

1. *On page v, the acronym CERA notes Detailed Ecological Risk Assessment. Should this acronym be “DERA”, or should CERA be “Comprehensive Ecological Risk Assessment”? Based on page 2-3, it appears that this acronym should be “DERA”. Please clarify this.*

**Response:** The acronym should be DERA and has been modified in the List of Acronyms.

2. *On page vi, the acronym for “Sewage Sludge Application Areas” is noted as “SSAs”. Was “SSAAs” intended here? Please clarify this.*

**Response:** The acronym for Sewage Sludge Application Areas has been SSAs in the documents leading up to this ROD and therefore no modification is made to the Final ROD.

**C. Declaration for the Record of Decision:**

1. *On page D-1 under the Statement of Basis and Purpose the following editorial revisions are recommended: delete “the” before “proposed” and “environmental” on 1st line; delete “the” before “Jefferson” on 2nd line; and “the presence of” before “hazardous substances” on the 6th line.*

**Response:** Comment incorporated as stated.

2. *On page D-2, delete “the” and “remedy” on the 2nd line from the top of the page.*

**Response:** Comment incorporated as stated.

3. *On page D-2 under Limited Action (Institutional Controls and Monitoring): the following editorial revisions are recommended: delete “alternative” on 1st line; and delete all three “the”’s on 6th line, where that sentence now reads as “Development of specific land use restrictions and groundwater monitoring frequency will be*

*determined during the remedial design (RD) phase with participation by the BRAC Cleanup Team (BCT)."*

**Response:** Comment incorporated as stated.

4. *On page D-2 under Excavation and Off-Site Disposal of Soils: PRGs from EPA Region 9 are referenced. Please note that Indiana is in Region 5. Please clarify why these PRGs are being used as guidelines in this report. In addition, the following editorial revisions in this paragraph are recommended: delete "alternative" and "the" on 1st line; replace "the" with "this" before "excavation" on 4th line; and replace "participation by the BCT" with "BCT participation" on the last line of paragraph.*

**Response:** The Army, USEPA, IDEM, and the RAB agreed on using the USEPA Region 9 residential PRGs during the RI phase of the project. The remaining comments are incorporated as stated.

5. *On page D-2 under Statutory Determinations the following editorial revisions are recommended: replace "The" with "These" at the beginning of 1st bullet; and rewrite 2nd bullet as follows: "Limited Action (institutional control and monitoring) is the proposed remedy for this contaminated groundwater. Natural attenuation is expected to occur as a result of this remedial action to reduce long-term concentration of organic compounds in groundwater."*

**Response:** Comment incorporated as stated.

6. *On page D-2 on the 3rd to last line, replace "five" with "5".*

**Response:** Comment incorporated as stated.

#### **D. Site Name, Location, and Description:**

1. *On page I-1, on the 3rd line from the bottom of page, replace "the use of DU" with "DU use".*

**Response:** Comment incorporated as stated.

#### **E. Site History and Enforcement Activities:**

1. *On page 2-1, on line 6 of opening paragraph delete “the” before “day-to-day”.*

**Response:** Comment incorporated as stated.

2. *On page 2-1 in the final paragraph of this page, add “(Sites 9/10)” after “Gate 19 Landfill” on line 3 and add “(Site 12C)” after “279”, “(Site 12A)” after “602”, and “(Site 12B)” after “617” on line 4.*

**Response:** Comment incorporated as stated.

3. *On page 2-2 on the 3rd line from top of page, it notes, “Eighteen sites were re-photographed and analyzed.” Are any of these 18 sites from the Installation Assessment Relook Program (September 1989) the same as the current 15 sites in the present investigation? Please clarify this.*

**Response:** Unknown, however, EPA, Region 5 via an internal administrative decision in the late 1990’s (after JPG closed in September 1995) decided to consolidate the RCRA compliance issues/site(s) at JPG with the CERCLA office to have a single point of contact for the Army and State.

4. *On page 2-2 on line 6 of 2nd paragraph, delete “the” before both “JPG” and “applicable”.*

**Response:** Comment incorporated as stated.

5. *On page 2-2 on line 5 of 3rd paragraph, it notes “36 SWMUs from the Enhanced PA”. Firstly, are any of these SWMUs related to any of the 15 current sites? Secondly, please note that SWMU denotes a RCRA study, whereas the PA is a CERCLA step. Is this October 1989 effort under RCRA or CERCLA? Please clarify this. In addition, delete “the” before “environmental quality” on the 3rd line of this paragraph.*

**Response:** EPA, Region 5 via an internal administrative decision in the late 1990’s (after JPG closed in September 1995) decided to consolidate the RCRA compliance issues/site(s) at JPG with the CERCLA office to have a single point of contact for the Army and State.

6. *On page 2-2 on line 3 of 5th paragraph, it notes, “The RFA identified 86 SWMUs and areas of concern (AOCs)”. Are any of these SWMUs or AOCs from the February 1992 RFA related to any of the 15 current sites? Please clarify this.*

**Response:** Unknown, however, EPA, Region 5 via an internal administrative decision in the late 1990’s (after JPG closed in September 1995) decided to consolidate the RCRA compliance issues/site(s) at JPG with the CERCLA office to have a single point of contact for the Army and State.

7. *On page 2-2 on line 2 of the next to last paragraph of this page, it notes “103 previously identified site at JPG.” For the IAP completed in March 1993. How do these previously identified 103 sites relate to the 15 current sites? Please clarify this.*

**Response:** The other sites are either UXO sites or sites north of the firing line in an area or areas that the Army Secretariat has made the decision that no cleanup north of the firing line at JPG will occur due to the high concentration of UXO.

8. *On page 2-3 on lines 2-3 of the 4th full paragraph, it notes that “After that time, an interim removal action was performed at 5 sites and additional monitoring wells were constructed and sampled.” Were these 5 sites closed out at this time, or were they eventually included in the 15 current sites noted on page 2-4? In addition, the acronym “MWH” on the next line (4) needs to be defined. Please clarify these items.*

**Response:** The 5 sites referenced in the comment were not closed out at the completion of the removal actions. The removal action for these sites was summarized in a Construction Completion Report, which was approved by USEPA and IDEM. Sites 12A, 12B, and 12C are included in the ROD for groundwater RA. Sites 13 and 33 are included in the ROD as NFA sites based on the successful removal action. MWH is the name of the company performing the work and no acronym identification is required.

9. *In summary for this section, the earlier studies in Sept 1989, Oct 1989, Feb 1992, and IAP completed in March 1993, need to be more clearly explained in terms of their relationship to the current study involving the 15 current sites. Alternatively, if these earlier studies indicated no further action at the respective sites, SWMUs, or AOCs, then clearly indicate that in the pertinent paragraph discussing the respective study.*

**Response:** See responses to Comments 3, 5, 6, and 7 above.

**F. Highlights of Community Participation:**

1. *On page 3-1, on the 3rd line of opening paragraph, replace “the public to submit comments” with “public comment”.*

**Response:** Comment incorporated as stated.

**G. Scope and Role of Operable Units or Response Actions:**

*No review comments in this section.*

**H. Site Characteristics and Table 5-1:**

1. *On page 5-1 on line 4 of opening paragraph, delete “the” at the end of this line.*

**Response:** Comment incorporated as stated.

2. *On the top of page 5-2, it’s noted that arsenic at this site (Site 1 – Building 185 Incinerator) is within the range of those found in background samples. What about the other three metals, namely, the beryllium, chromium, and manganese, which were cited with arsenic as not being below the risk-based criteria from USEPA Region 9? Are these three metals within the background range like arsenic, or are they above background levels? Another reminder, please note that Indiana is in Region 5 instead of 9. See comment C.4 above under the comments for the Declaration for the Record of Decision.*

**Response:** Of the metals, only arsenic is within the range of background samples. As stated, all metals and dioxins were retained for the risk analysis. The Region 9 PRGs were used as agreed by all parties in the RI phase. No modifications needed as a result of the comment.

3. *On page 5-2 under Sites 2/27 in the 2nd paragraph, are chromium, manganese, silver and/or thallium consistent with or above background levels? Please clarify this.*

**Response:** Unless stated, all metals are above background. No modification needed to address this comment.

4. *On page 5-2 in the bottom paragraph on Sites 3 and 4, is the New Burn Site west or east of Papermill Road?*

**Response:** The New Burn Site is located west of Sites 3/4 but is still east of Papermill Road. The ROD has been revised to clarify this.

5. *On pages 5-2 and 5-3 for Section 5.3 (Sites 3 and 4), there is no mention at all of zinc nor benzo (a) pyrene (BAP). However, these are both cited as primary COCs in Table 7-1, where BAP is the primary carcinogenic COC and zinc is the primary non-carcinogenic COC. Moreover, 2,3,7,8-TCDD is mentioned in this text and comes up in Table 7-1. Please reconcile these apparent disconnects.*

**Response:** Section 5.3 has been revised to include zinc and BAP to the contaminant list for the New Burn Site. The trench contaminant discussion is complete.

6. *On page 5-3 in the opening paragraph of Section 5.4 (Sites 7/21B), reference is made to Figure 2 in the opening sentence. Please note that Building 211 and Woodfill Road are not clear in Figure 2. Building 211 is just north of these sites so that this may be the unmarked building with two sub-compartments. Is the road between this building and Site 21B Woodfill Road? Also, where are the railroad tracks on Figure 2? Please clarify these items.*

**Response:** These items will be identified in the Groundwater RA Project Plan. In addition, the railroad tracks have been sold and turned over to the Madison Port Authority the local municipal railroad.

7. *On page 5-3 in the 2nd paragraph of Section 5.4 (Sites 7/21B), there should be some mention of the direction of groundwater flow in this area. Perhaps, this could be covered in the 4th paragraph of this section. In addition, in the 5th paragraph of this section, are aluminum, barium, beryllium, and manganese consistent with or above background levels? Please clarify these items.*

**Response:** Section 5.4 was revised to include the groundwater flow direction, which is to southwest.

The metals contamination in the one soil sample was not consistent with background levels. After soils removal, only one confirmation soil sample had metals above USEPA Region 9 PRGs. As indicated in Table 7-1, these do not pose a risk for the intended land use. Section 5.4 will be revised to clarify this.

8. *On page 5-4 on the last line of top paragraph, replace “the” with “this” before “groundwater for arsenic”.*

**Response:** Comment incorporated as stated.

9. *On page 5-4 on line 2 of opening paragraph of Section 5.5 (Sites 9/10), is West Perimeter Road the diagonal west of Tokyo Road in Figure 2? Please clarify this.*

**Response:** Correct. However, the Figure 2 will not be revised to show this additional level of detail.

10. *On page 5-4 in the bottom three paragraphs of Section 5.5 (Sites 9/10), it should be noted as to whether the specific contaminants are consistent with or exceed background levels when they exceed USEPA Region 9 criteria.*

**Response:** Unless stated specifically, contaminants that exceed USEPA Region 9 PRGs also exceed background. No modifications were necessary to address this comment.

11. *On page 5-5 in the 2nd paragraph of Section 5.6 (Site 12A), how much volume of contaminated soils was excavated in 1988? In addition, in the subsequent (3rd) paragraph, this should be noted for the removal actions that took place in 2000 in the vicinity of the solvent pit for both the 3-feet and additional 4-feet depths. On line 4 of this paragraph, delete “the” before “effectiveness” and replace “the” with “this” before “removal action”.*

**Response:** The Army does not readily have information regarding how many cubic yards of soil were excavated in 1988 as part of the removal of the 25,000-gallon UST. IDEM approved the close out of the USTs and associated soils removal when completed at these sites.

The quantities of soils removed during the 2000 removal actions at Sites 12A, 12B, and 12C were identified in the Construction Completion Report (CCR), which was approved by USEPA and IDEM. At Site 12A, approximately 140 tons of soil were removed in 2000. This information was addressed in the ROD just to give a short background of the sites, but soils are not part of the RA identified for Sites 12A, 12B, and 12C. The remaining editorial comments are addressed as stated.

12. *On page 5-5 in the 3rd paragraph of Section 5.7 (Site 12B), how much volume of contaminated soils was excavated in the removal actions that took place in 2000 in the vicinity of the solvent pit for both the 3-feet and 8-feet depths. On line 2 of this paragraph, delete “the” before “effectiveness” and replace “the” with “this” before “removal action”.*

**Response:** At Site 12B, approximately 130 tons of soil were removed in 2000. The remaining editorial comments are addressed as stated.

13. *On pages 5-5 and 5-6 for Section 5.7 (Site 12B), there is no mention at all of 1,1-dichloroethylene (1,1-DCE) nor 1,2-dichloroethane (1,2-DCA). However, these are both cited as COCs in Table 7-1 under the critical exposure pathway of groundwater ingestion. Please reconcile this apparent disconnect.*

**Response:** Section 5.7 and Table 7-1 will be revised to clarify the principal COCs in groundwater.

14. *On page 5-6 on line 7 in the 1st full paragraph, delete “the” before “analytical”.*

**Response:** Comment incorporated as stated.

15. *On pages 5-6 for Section 5.8 (Site 12C), there is no mention at all of 1,1,1-trichloroethane (1,1,1-TCA), 1,1-dichloroethylene (1,1-DCE), nor trichloroethene (TCE). However, these are cited as COCs in Table 7-1 under the primary exposure pathway of groundwater ingestion. Please reconcile this apparent disconnect. See comment 18 below.*

**Response:** Section 5.8 and Table 7-1 will be revised to clarify the principal COCs in groundwater.

16. *On page 5-6 in the opening paragraph of Section 5.8 (Site 12C), reference is made to Meridian Road on line 2. Where on Figure 2 is Meridian Road? Is Meridian Road between Shun Pike Road and Papermill Road or is it all the way to the right past Shun Pike Road? Please also note that this surfaces at the beginning of Section 5.10 (Sites 21A/30) on page 5-7. From this it appears that Meridian Road is between Shun Pike Road and Papermill Road.*

**Response:** Meridian Road is the north-south road between Shun Pike Road and Papermill Road. However, the Figure 2 will not be revised to show this additional level of detail.

17. *On page 5-6 in the 3rd paragraph of Section 5.8 (Site 12C), how much volume of contaminated soils was excavated in the removal action that took place in 2000 in the vicinity of the solvent pit for both the 3-feet and 8-feet depths. On line 2 of this*

*paragraph, delete “the” before “effectiveness” and replace “the” with “this” before “removal action”.*

**Response:** At Site 12C, approximately 40 tons of soil were removed in 2000. The remaining editorial comments are addressed as stated.

18. *On page 5-6 in the 5th paragraph of Section 5.8 (Site 12C), what is the reference compound of concern (COC) for this being a strong candidate for natural attenuation? Is it TCE, 1,1,1 – TCA or some other chlorinated organic compound or a combination of multiple compounds? If, indeed, there is no COC, then put this site in for no further action (NFA)! Otherwise strongly reconsider in view of comment 15 just above. Please clarify this.*

**Response:** The principal COCs are 1,1,1-trichloroethane and 1,1-dichloroethylene. Section 5.8 and Table 7-1 will be revised to clarify the principal COCs in groundwater.

19. *On page 5-7 in the opening paragraph of Section 5.9 (Site 14), reference is made to Infantry Road. Where on Figure 2 is Infantry Road? Is Infantry Road a continuation of Ordnance Drive?*

**Response:** Infantry Road is the first east-west road north of Ordnance Drive and its intersection with Papermill Road. However, the Figure 2 will not be revised to show this additional level of detail.

20. *On page 5-7 in the 2nd paragraph of Section 5.9 (Site 14), what was the depth of excavation for that 3,750 ft<sup>2</sup> area of that interim removal action?*

**Response:** Approximately 3 to 4 feet.

21. *On page 5-7 on line 3 of 5th paragraph of Section 5.9 (Site 14), delete “the” before “excavation”.*

**Response:** Comment incorporated as stated.

22. *On page 3 of Table 5-1 for Site 23, add “Building 216” before “Potential Solvent Disposal Pit under the “Site Name” Column.*

**Response:** Comment incorporated as stated.

23. *On page 5 of Table 5-1 for Site 35, add “Building 602” before “Former Leaking UST” under the “Site Name” Column.*

**Response:** Comment incorporated as stated.

#### **I. Current and Potential Site and Resources Uses:**

1. *On page 6-1 on line 5 of 2nd paragraph of Section 6.1 (Current Land Use), replace “the” with “this” before “area”.*

**Response:** Comment incorporated as stated.

#### **J. Summary of Site Risks and Table 7-1:**

1. *On page 7-1, in the 2nd paragraph, it notes that the model assumes that winds would generate dust 252 days per year. What was the rationale for this assumption? Was this based on past meteorological data or some other study? Please explain this further.*

**Response:** This was determined during the RI. Page 5-43 of the Final RI states:

***Exposure Frequency (EF).*** The exposure frequency is the number of days per year that an individual comes into contact with a contaminated environmental medium. The average monthly low temperature in southern Indian is less than freezing (32°F) for 3 months of the year (Table 2-1). Generation of fugitive dust and volatile emissions would be expected to be greatly reduced during these 3 winter months. The current trespasser, therefore, was assumed to be exposed to facility contaminants via inhalation of air 2 days per week, 4 weeks per month, during the 9 warmer months (72 days per year). Current and future residents (adults and children) were assumed to be exposed to contaminants in ambient air 252 days per year (7 days per week, 4 weeks per month, 9 months per year).

In summary, in the winter when the ground is frozen and when people are not outside as much, they assumed that exposure did not occur.

2. *On page 2 of Table 7-1 under Sites 9/10 on the 1st bullet under Ecological Risk Summary Column, replace “effect” with “effected” at the end of this bullet.*

**Response:** Comment incorporated as stated.

**K. Remedial Action Objectives and Table 8-1: - No review comments in Section 8 itself, but please note the following 3 errors in Table 8-1:**

1. *For Site 4 – Trench Area, the USEPA 2002 Region 9 residential soil PRG for cadmium is 37 mg/kg instead of the noted 3.7 mg/kg. --- Page 1*

**Response:** Comment incorporated as stated.

2. *For the New Burn Site, the USEPA 2002 Region 9 residential soil PRG for benzo (a) pyrene 0.062 mg/kg instead of the noted 0.6 mg/kg. --- Page 1*

**Response:** Comment incorporated as stated.

3. *For Site 14, the USEPA 2002 Region 9 residential soil PRG for chromium VI is 30.0 mg/kg instead of the noted 30.1 mg/kg. --- Page 3*

**Response:** Comment incorporated as stated.

**L. Description of Alternatives:**

1. *On page 9-1 under Section 9.1 (Site 1), delete “the” before “further risk evaluation” on line 1.*

**Response:** Comment incorporated as stated.

2. *On page 9-3 for Sites 7/21B, as Alternative 3 (Collection and Treatment) is cited, were other in-situ treatments considered, such as ion-exchange membranes, phytoremediation, or other absorption/adsorption methods? This comment is also relevant to the discussion of Alternative for Site 12A on page 9-4, Site 12B on page 9-5, Site 12C on pages 9-5 and 9-6, and Site 14 on page 9-6. Furthermore, other bioremediation alternatives are viable if the contaminant is organic in nature instead of merely metals as is the case for Sites 7/21B and 14.*

**Response:** Alternatives for remediation were reviewed in the Final Feasibility Study. The viable alternatives to meet the remedial action objectives for each site were screened against the CERCLA evaluation criteria. The alternative addressed in the

ROD are the preferred remedies as presented to the public in the Proposed Plan and agreed upon with the regulators and the public.

**M. Summary of Comparative Analysis of Alternatives and Tables 10-1 through 10-8:  
- No review comments in Section 10 itself, but please note the following comments in  
Tables 10-1 through 10-8:**

1. *On Table 10-1, what soil volume for excavation and disposal is proposed for Alternative 3? Is it 1,000 cubic yards, based on Table 12-1?*

**Response:** The volume was estimated as part of the alternative evaluation in the FS. The volume will be refined in the Soils RD/RA Project Plan.

2. *Table 10-2 – no comments*
3. *Table 10-3 – no comments*
4. *Table 10-4 – no comments*
5. *On Table 10-5, add “Solvent Pit” after “Building 617” on the 2nd line of the heading.*

**Response:** Comment incorporated as stated.

6. *On Table 10-6, add “Solvent Pit” after “Building 279” on the 2nd line of the heading. Furthermore, why is it easier to remove groundwater under Alternative 3 from Site 12C than it was for Sites 12A and 12B, which both noted “Difficult to remove groundwater” under the “Reduction of Toxicity, Mobility, or Volume Through Treatment” Column. For Sites 12A and 12B, the ranking for this column is 8, whereas for Site 12C, the ranking is 10. Also, there is a similar difference in the “Implementability” ranking, where 12A and 12B have 3 and 12C shows 5. This difference needs to be more clearly explained.*

**Response:** The groundwater VOC plume at Site 12C is a really small, vertically restricted, and relatively lower concentration when compared to Sites 12A and 12B. Therefore, Alternative 3 received a slightly more favorable score for Site 12C.

7. *On Table 10-7, please note that the “Implementability” ranking of 5 for Alternative 3, whereas it’s 10 for the other 2 alternatives. Yet, the comment for Alternative 3 is implementable. Is it difficult to remove groundwater and/or is construction required?*

*Please clarify this. This may also affect the ranking under the “Reduction of Toxicity, Mobility, or Volume Through Treatment” Column.*

**Response:** While Alternative 3 is implementable, it is much more involved than Alternatives 1 and 2, thus gets the lower ranking.

8. *On Table 10-8, what soil volume for excavation and disposal is proposed for Alternative 3? Based on Table 12-10, it is 20 cubic yards and is noted on page 12-14 in the opening paragraph of Section 12.10.3.*

**Response:** The volume was estimated to be 20 cubic yards for purposes of the cost estimate to evaluated alternatives.

#### **N. Principal Threat Waste:**

*No review comments in this section.*

#### **O. Selected Remedies and Tables 12-1 through 12-10:**

1. *On page 12-2 in the 2nd paragraph under Section 12.3.2 (Detailed Description of the Selected Remedy – for Sites 3 and 4) the following editorial revisions would be helpful:*
- a. On line 4, replace “the usage of water” with “usage of this water”.*
  - b. On lines 7 and 8, replace “concurrence of the regulatory agencies” with “regulatory concurrence”.*

**Response:** Comments incorporated as stated.

2. *On page 12-3 in the 3rd bullet under Section 12.3.4 (Expected Outcome of Selected Remedy), the following corrections are needed:*
- a. The USEPA Region 9 residential soil PRG for cadmium is 37 mg/kg, not the noted 3.7 mg/kg.*
  - b. The USEPA Region 9 residential soil PRG for benzo (a) pyrene is 0.062 mg/kg, not the noted  $3.9 \times 10^{-6}$  mg/kg.*

**Response:** Comments incorporated as stated.

3. *On page 12-4 under Section 12.4.1 (Summary of the Rational for the Selected Remedy – Sites 7/21B), it notes that this alternative has the lowest present worth cost (PWC). It's true that it has a lower PWC than alternative 3, but not alternative 1, which is No Action. It's recommended that PWC be discussed in a following sentence by noting that it's the lower PWC of the two most serious alternatives. This comment also applies on page 12-6 under Section 12.6.1 (Summary of the Rational for the Selected Remedy – Site 12A), page 12-8 under Section 12.7.1 (Summary of the Rational for the Selected Remedy – Site 12B), and page 12-10 under Section 12.8.1 (Summary of the Rational for the Selected Remedy – Site 12C).*

**Response:** Comment incorporated as stated.

4. *On page 12-13 in the 3rd bullet under Section (12.9.4 Expected Outcome of Selected Remedy – Site 14), the cleanup level for chromium in soil is 30 mg/kg, not 30.1 mg/kg.*

**Response:** Comment incorporated as stated.

5. *On Table 12-1 in the notes on 5th line, it states “Characterization samples assumes 22.5 tons/rolloff. However, in the table itself, 22 tons is noted for the characterization tests. Please reconcile this apparent discrepancy.*

**Response:** The table and notes are correct as they are. It is estimated that each roll off will contain 22.5 tons of soil, and the volume to be excavated is 1500 tons. Therefore 66.6 roll offs will be filled after excavation. As noted in the 5<sup>th</sup> line, one third of the roll offs will be tested for soil characterization, i.e., 22 tests, which is in the table for characterization tests.

**P. Statutory Determinations and Tables 13-1 through 13-3:**

1. *On page 13-1 on the 3rd line from the top of the page, replace “five-year” with “5-year”.*

**Response:** Comment incorporated as stated.

2. *On page 13-3 on lines 1 and 5 under Section 13.6 (Five-Year Review Requirements), replace “five-year” with “5-year”.*

**Response:** Comment incorporated as stated.

3. *On Table 13-1, the following corrections are required:*

- a. *For the Federal Historical and Archeological block on page 1, this is under 36 CFR, not 40 CFR. Probably, 36 CFR 60 may be intended here.*
- b. *For the Federal RCRA Transport of Hazardous Waste block on page 2, this is only in 40 CFR 263, not in both 263 and 264. 40 CFR 264 deals with the TSD (treatment, storage, and disposal) facilities, whereas 40 CFR 263 deals with the transport of hazardous waste to a licensed facility.*
- c. *For the Indiana Hazardous Waste Law block on the top of page 3, this is in Title 323, not 13, which is dealing with Housing Regulations in Indiana. Furthermore, note that Indiana Water Regulations are in Title 327, so other environmental regulations would have Title numbers in the 300-range instead of 13. Please adjust these legal citations accordingly.*

**Response:** Comments incorporated as stated.

**Q. Documentation of Significant Changes:**

1. *On page 14-1 on the 2nd line from top of page, delete “the” before “public” and delete “to” after “public”.*

**Response:** Comment incorporated as stated.

2. *On page 14-1 on the 2nd line after the bullets, note the typo by replacing “Wisconsin” with “Indiana”.*

**Response:** Comment incorporated as stated.

**R. References:**

*No review comments in this section.*

**S. Community Participation Responsiveness Summary:**

1. *On page RS-1, on line 3 of 2nd paragraph, replace “thirty” with “30”.*

**Response:** Comment incorporated as stated.

2. *On page RS-2 under Section 1.2 (Sampling of Pesticides at Harberts Creek), it notes, “Only one surface sample contained the pesticide DDE at a level exceeding the USEPA Region 9 residential PRG.” For the current sites, the only pesticide mentioned was dieldrin in soil at Sites 21A/30, which is Building 204 Temporary Storage Area. Please clarify this apparent discrepancy.*

**Response:** As noted on page 5-3, DDE was detected at the New Burn Site above USEPA Region 9 residential PRGs, however when the risk assessment was performed, the contaminants of concern were identified as those listed in Table 7-1.

3. *On page RS-5 on line 5 of the 2nd paragraph under Section 1.5 (Additional Antimony Characterization Testing), add “to” after “significant risk” and insert as comma after “receptors”.*

**Response:** Comment incorporated as stated.

Point-of-Contact: For any questions, please feel free to contact Dr. David K. Goldblum at (703) 601-1932 or DSN: 329-1932.

**C2**

**October 15, 2004 BRACO E-Mail**



"Beckwith, Todd T  
USAEC"  
<todd.beckwith@us.ar  
my.mil>

10/15/2004 02:46 PM

To: "Paul Cloud (E-mail)" <paul.d.cloud@us.army.mil>, "Evens, Andrew B  
LRL02" <Andrew.B.Evens@lrl02.usace.army.mil>, 'Bruce A Iverson'  
<Bruce.A.Iverson@us.mwhglobal.com>

cc:

Subject: FW: JPG ROD: Response to BRACO, IDEM, and ESOH Comments  
(UNCLASS IFIED)

FYI. Should be good to go.

-----Original Message-----

From: Goldblum, David K Dr BRACO  
Sent: Friday, October 15, 2004 2:44 PM  
To: Beckwith, Todd T USAEC  
Subject: RE: JPG ROD: Response to BRACO, IDEM, and ESOH Comments  
(UNCLASSIFIED)

Classification: UNCLASSIFIED  
Caveats: NONE

No problem! With these other changes, the ROD should now be in good shape.  
Thanks for all of your support. Have a nice week end. Dave G

-----Original Message-----

From: Beckwith, Todd T USAEC  
Sent: Friday, October 15, 2004 2:35 PM  
To: Goldblum, David K Dr BRACO  
Cc: Doherty, Michael C Mr BRACO; Beach, Lawrence M BRACO; Stauber, Ricky  
S Mr BRACO; Anderegg, Elaine S Mrs BRACO; Paul Cloud (E-mail); 'Evens,  
Andrew B LRL02'  
Subject: RE: JPG ROD: Response to BRACO, IDEM, and ESOH Comments  
(UNCLASSIFIED)

David - thanks. we can make these changes, except for number 4. The risk  
assessment and exposure assumptions have all been approved by the regulatory  
agencies. They approved the specific assumption that dust would be  
generated 252 days a year, therefore I don't think we want to reopen that  
issue. It would cause significant delay and really isn't warranted given  
the regulatory approval of 252 days.

-----Original Message-----

From: Goldblum, David K Dr BRACO  
Sent: Friday, October 15, 2004 2:16 PM  
To: Beckwith, Todd T USAEC  
Cc: Doherty, Michael C Mr BRACO; Hood, Wesley Mr BRACO; Beach, Lawrence  
M BRACO; Stauber, Ricky S Mr BRACO; Derrick, Robert R COL BRACO;  
Anderegg, Elaine S Mrs BRACO  
Subject: RE: JPG ROD: Response to BRACO, IDEM, and ESOH Comments  
(UNCLASSIFIED)

Classification: UNCLASSIFIED  
Caveats: NONE

Hi Todd:

I have reviewed the response to comments. For the most part the response to  
the comments are adequate. However, I would like to make the following  
recommendations:

1. For the use of PRGs from EPA Region 9, it should be noted when this is  
first mentioned under the Declaration for the Record of Decision, that all

parties including the State, RAB, Army, and EPA Region 5 agreed to the use of these PRG's.

2. Near the beginning of Section 2 (Site History and Enforcement Activities), it should be noted that EPA Region 5 via an internal administrative decision in the late 1990's (after JPG closed in September 1995) decided to consolidate the RCRA compliance issues/site(s) at JPG with the CERCLA office to have a single point-of-contact for the Army and State.

3. Near the beginning of Section 5 (Site Characteristics), it should be noted that a compound of concern is above background levels unless otherwise stated.

4. In Section 7 (Summary of Site Risks), when it notes that the model assumes that winds would generate dust 252 days per year, it should then be noted that 7 days/week and 4 weeks/month and 9 months/year are assumed due to the volatile emissions being greatly reduced during the 3 coldest months. Finally, please note that there are usually slightly more than 4 weeks/month, which means that the number of days of exposure to dust emissions will be close to 274 days/year ( $365.25 \times 9/12$ ). You may want to reconsider this.

5. On Table 10-7 under the "Implementability" Column, you may want to revise the comment for Alternative 3 by saying implementable with some difficulty.

If you have any further questions, please feel free to contact me at DSN: 329-1932.

Thanks.

Dr. David K. Goldblum, P.E., C.H.M.M.  
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Office of the ACSIM  
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2511 Jefferson Davis Highway, PT 9642  
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E-mail: David.Goldblum@hqda.army.mil

-----Original Message-----

From: Beckwith, Todd T USAEC  
Sent: Friday, October 15, 2004 10:19 AM  
To: Beach, Lawrence M BRACO; Goldblum, David K Dr BRACO  
Cc: Paul Cloud (E-mail); Anderegg, Elaine S Mrs BRACO; Doherty, Michael C Mr BRACO  
Subject: FW: JPG ROD: Response to BRACO, IDEM, and ESOH Comments

Larry - attached are responses to Dave Goldblum's comments and Rick Newsome's comments. Rick's comments will all be incorporated in the ROD. We're almost there. Do you want a hard copy of the final ROD sent to you for signature by COL Derrick, or will electronic copy suffice?

Dave - please review responses and let us know if the responses are acceptable.

Todd

-----Original Message-----

From: Bruce A Iverson [mailto:Bruce.A.Iverson@us.mwhglobal.com]  
Sent: Friday, October 15, 2004 9:52 AM  
To: paul.d.cloud@us.army.mil; todd.beckwith@us.army.mil  
Cc: Andrew.B.Evens@lrl02.usace.army.mil; lbusse@bt2inc.com  
Subject: JPG ROD: Response to BRACO, IDEM, and ESOH Comments

Paul and Todd

Attached for your review and comment are response to comments associated with comments received from the following for the JPG Record of Decision:

Dr. David Goldblum in an e-mail dated September 24, 2004 (refer to Todd's e-mail dated 9-24-04 that forwarded the comments).

IDEM in an e-mail dated October 1, 2004 (refer to Brook's e-mail dated 10-5-04 that forwarded the comments).

ESOH comments in an e-mail dated October 13, 2004 (refer to Todd's e-mail dated 10-14-04 that forwarded the comments).

During your review, please note that we would like your input to IDEM comment 11 on LUC.

In addition, it is our understanding that the following agencies had no comments or minor comments on the ROD, therefore, response to comments have not been prepared for these agencies:

ODEP one minor comment (refer to Paul's e-mail dated 10-13-04) that has been addressed.

ELD, refer to Todd's e-mail dated 10-14-04

OTSG, refer to Lawrence Beach's e-mail dated 10-14-05

Please send your comments to Brooks and me. In the meantime, if you have any questions, please call me. Thanks, Bruce 608-231-4747

(See attached file: 64\_ROD Review Comments Dr Goldblum.doc) (See attached file: 63\_IDEM Resp to Comm DF ROD.doc) (See attached file: 62\_ESOH Resp to Comments ROD (unclassified).doc)

Classification: UNCLASSIFIED

Caveats: NONE

Classification: UNCLASSIFIED

Caveats: NONE

3-END

## **APPENDIX D**

### **ESOH COMMENTS AND RESPONSES TO COMMENTS ON DRAFT FINAL ROD**

## RESPONSES TO ESOH COMMENTS

### Record of Decision (ROD) Jefferson Proving Ground Madison, Indiana

Following are the Army's response to ESOH comments from Mr. Richard Newsome presented in the e-mail dated October 13, 2004 associated with the Final Record of Decision dated September 2004 for the Jefferson Proving Ground in Madison, Indiana. The following numbering system corresponds to the numbers used in the e-mail.

1. *Page D-3, Air Force is missing a "c".*

**Response:** Comment incorporated as stated.

2. *Page 1-1, in first paragraph a ". (period)" is missing between "...Firing Line" and "In addition..."*

**Response:** Comment incorporated as stated.

3. *Page 10-1, missing "health" in point #5 after "...human."*

**Response:** Comment incorporated as stated.

4. *It appears the sites being assessed in this ROD are called both "locations" (Pages 2-3 and 4-1) and "impact areas" (Pages D-1, 1-1, 5-1), when referring to the 50 sites addressed (combined from 54 sites). The term "impact area" is used to describe the locations impacted by the contaminants. However, this may cause confusion because the term "impact area" is also used to describe areas where high-explosive rounds were fired at (Page 1-1), and these areas are not addressed in the ROD. Therefore, suggest changing the descriptors using "impact area" to "locations" to avoid confusion.*

**Response:** Comment incorporated as stated.